Making good quality care habitual: An exploration of the concept habit in relation to healthcare professional behaviour

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Sebastian Potthoff

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Institute of Health and Society, Faculty of Medical Sciences

Newcastle University

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Thesis abstract

Translating evidence-based guidance into practice involves healthcare professionals (HCPs) adopting new, and changing existing behaviours. Implementation research typically focuses on the reflective process that underlies HCPs' behaviour, however there is a growing interest in the role that impulsive processes such as habit have on behaviour. Habit can be defined as a learned tendency to perform a behaviour automatically in response to a specific cue. This thesis presents four studies investigating how a habit perspective can contribute to understanding HCPs' behaviour. Chapter 1 describes how a greater consideration of habit in the implementation literature could contribute to the field. Chapter 2 presents theory-based interviews conducted with HCPs who piloted a new self-management tool for diabetes. The study showed how HCPs formed a new habit of using the tool and how electronic reminders facilitated this process by promoting behavioural repetition. Chapter 3 describes a randomised controlled trial that aimed to test whether a planning intervention (using action- and coping planning) would be effective in supporting HCPs with habit change. While the study did not reach recruitment targets, it provided some first insights regarding the feasibility of using a planning intervention to support HCP behaviour change. Chapter 4 presents a secondary analysis of a large national data set, which found that the relationship between planning (action and coping planning) and six guideline-recommended behaviours operated indirectly on HCP behaviour via habit. Finally, Chapter 5 describes a systematic review and meta-analysis of studies investigating the association between habit and HCPs' behaviour and showed that habit plays a significant role in predicting clinical behaviours. This thesis supports the consideration of habit when predicting HCPs' behaviour and suggests that the use of conditional planning interventions may offer a feasible approach to support HCPs with creating and breaking habit.

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- **Potthoff, S.**, Presseau, J., Sniehotta, F.F., Elovainio, M., & Avery, L. (2017). Planning to be routine: habit as a mediator of the planning-behaviour relationship in healthcare professionals. *Implementation Science*. DOI: 10.1186/s13012-017-0551-6.
- **Potthoff, S.**, Rasul, O., Sniehotta, F.F., Beyer, F., Bryant, A., Thomson, R., Avery, L., & Presseau, J. (submitted). The Relationship between habit and healthcare professional behaviour in clinical practice: a systematic review and meta-analysis. *BMJ Quality & Safety.*
- **Potthoff, S.**, Presseau, J., Sniehotta, F.F., Breckons, M., Rylance, A., & Avery, L. (submitted). Exploring the role of competing demands and routines on the implementation of a self-management tool for type 2 diabetes: A theory-based interview study. *Implementation Science.*

Conference presentations

- **Potthoff, S.**, Sniehotta, F.F., Rylance, A., Avery, L., & Presseau, J. (2017). Web-based planning intervention to improve the uptake of Diabetes UK information prescriptions in clinicians. Presented at the 31st European Health Psychology Society Conference, Padova, Italy. Poster presentation.
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- **Potthoff, S.**, Presseau, J., Sniehotta, F.F., Breckons, M., Rylance, A., & Avery, L. (2016). The impact of dual processes and competing goals on health professionals' uptake of a new information prescription for diabetes. Presented at the International Congress of Behavioural Medicine Melbourne, Australia. Oral Presentation.
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Invited Talks

- Invited talk: 'Making good quality care habitual: an exploration of the concept habit in relation to healthcare professional behaviour'. Australian Institute of Health Innovation seminar series at Macquarie University, Sydney, Australia, December 2016.
- Invited talk: 'The role of habit in implementation'. Implementation science course (PhD level) at Linkoeping University, Linkoeping, Sweden, October 2016.
- Invited talk: 'Healthcare professionals' views of the Diabetes UK Information Prescription to facilitate optimisation of type 2 diabetes management in primary care: A qualitative exploration'. At the 2016 Diabetes UK Professional Conference, Glasgow, Scotland, March 2016.

Chapter 1. Introduction

1.1 Evidence to practice gap

Internationally healthcare continues to change rapidly with a drive to implement more interventions that are both clinically and cost-effective (McClellan *et al.*, 2007). In England, a national report entitled 'Innovation Health and Wealth: Accelerating Adoption and Diffusion in the NHS" set out to support the adoption and diffusion of health innovations across the National Health Service (NHS) (*Department of Health, innovation, health and weatlh: accelerating adoption and diffusion in the NHS*, 2011). The effort to improve quality of care has led to the promotion of *evidence-based medicine* (EBM), which aims to integrate clinical expertise with external scientific evidence and the perspective of patients (Sackett *et al.*, 1996). Despite the rapid growth of EBM there is clear room for improvement. For example, a systematic review that assessed healthcare professionals' adherence to 29 clinical guideline recommendations across 11 primary studies found that only a third of these guidelines were routinely adhered to and that adherence rates varied from just above 20 to over 80% (Mickan *et al.*, 2011). Similar findings have been observed across a range of different clinical areas (e.g., alcohol dependency and coronary heart disease) in different countries (Grol and Grimshaw, 2003; Sederer, 2009; Runciman *et al.*, 2012). The delay in translation of clinical research evidence into routine practice is known as the "*evidence to practice gap*" or "*second translational gap*" (Woolf, 2008). Two approaches that aim to address the research to evidence gap will be described.

1.2 Implementation as behaviour change

Implementation can be defined as "a planned process and systematic introduction of innovations and/or changes of proven value; the aim being that these are given a structural place in professional practice, in the functioning of organisations or in the health care structure" (ZON, 1997). There are numerous approaches which could improve care in relation to implementation. For instance, one can focus on making changes at a policy level, organisational level or an individual level (Grol *et al.*, 2005). In the content of this PhD thesis, the focus is at the individual level of the healthcare professional. At this level,

implementation can be conceptualised as an issue involving the need to help healthcare professionals adopt new behaviours. For example, healthcare professionals may be advised to provide a new evidence-based information leaflet that informs people with type 2 diabetes about the importance of physical activity. The following section describes how a theory-based approach can contribute to understanding and changing the behaviour of individual healthcare professionals.

1.3 Theory-based approaches to understanding healthcare professional behaviour

Behaviour change interventions are often complex and involve multiple components (Michie *et al.*, 2009). For example, interventions that aim to improve hand-hygiene practices in hospitals might involve educating healthcare professionals about the importance of washing hands, provide the means to adhere to hand washing (i.e. adequate soap dispensers and soap), and rewarding good compliance (Fuller *et al.*, 2012; Squires *et al.*, 2014). Often such interventions result in different treatment effects depending on the characteristics of the target group and/or the context (Veronovici *et al.*, 2014). For this reason, we must not only identify the average effect size of interventions, but also account for variables that moderate these effects. Furthermore, it is important to identify variables that mediate the relationship between predictor and outcome variables (Kazdin, 2010). For the purpose of this thesis, existing theories of behaviour will be utilised. The advantage of utilising well-established theories is that they provide a robust evidence-base and delineate relationships between constructs that may predict healthcare professionals' behaviour.

Theories commonly used within the implementation sciences assume that healthcare professionals behaviour is determined by a reflective decision-making process (Godin *et al.*, 2008). The *reflective* process relates to all conscious cognitive processes that are involved in reaching a decision and supporting the performance of behaviour. For example, if a healthcare professional changes his/her behaviour based on a reflective decision-making process, he or she might weigh the pros against the cons before adopting the new behaviour. One systematic review identified twelve studies using social

cognitive models to predict the behaviour of healthcare professionals (Godin *et al.*, 2008). In this review involving a sample size of 1754 healthcare professionals, reflective processes collectively explained 31% of the variance in behaviour (Godin *et al.*, 2008). Most of the social cognitive models view intention as the main predictor of behaviour. Intention refers to a person's motivation to enact a given behaviour. Research in general population and patient samples find intention to be a relatively good predictor of behaviour in longitudinal studies (Orbell and Sheeran, 2000), however findings in different areas show a substantial intention-behaviour gap. The intention-behaviour gap refers to the phenomenon that many people with strong motivation do not always act in accordance with this intention (Orbell and Sheeran, 2000).

A further limitation of intention-focused theories is that they are often limited to predicting individual behaviours, however, healthcare professionals have to navigate multiple behaviours. Therefore there is a need to acknowledge multiple goals and how these goals might interact with each other (Presseau *et al.*, 2009; Presseau *et al.*, 2010; Presseau *et al.*, 2011). This PhD thesis aims to extend current theorising about healthcare professional behaviour change by exploring how a dual process and multiple goals approach can add to the prediction of their behaviour. The next section provides a brief overview of how habit can contribute to the understanding of healthcare professional behaviour.

1.4 The role of habit in healthcare professionals

Healthcare professionals deliver various aspects of care on a routine basis (e.g., providing advice, examining, or prescribing medication). Frequent repetition of a given behaviour in a stable context can lead to the formation of habit (Lally *et al.*, 2010). Habit can be defined as a learned tendency to perform a behaviour in response to a specific cue in the situational context. Behaviour is initiated automatically by these cues and with increased repetition it becomes less reliant on conscious motivation (Gardner, 2014). Importantly, habit is not defined as a behaviour, but rather as a tendency or impulse towards action (Gardner, 2014). This definition of habit is in line with current theoretical and empirical evidence and makes it possible to use habit as a predictor of action.

Presseau and colleagues conducted a prospective correlational study in which they examined the extent to which reflective and impulsive behavioural components could account for variability in performance of six guideline-recommended behaviours in diabetes care (Presseau *et al.*, 2014). The impulsive process in decision-making is largely non-conscious and allows individuals to react quickly and efficiently in response to cues (Deutsch and Strack, 2006). They tested whether a dual-process model could explain variability in the following six guideline-recommended behaviours: blood pressure prescribing, prescribing for glycaemic control, providing diabetes-related education, providing weight advice, providing self-management advice, and examining the feet. Consistent with Godin and colleagues' (2008) review, they found that reflective processes predicted all six behaviours. More importantly, they found that four of the six behaviours (all but providing self-management advice and diabetes-related education) were predicted by parallel impulsive processes supporting the role of non-conscious and automatic processes in healthcare professional behaviours.

Another line of research explored the effects of implicit processes in clinical decision-making (de Vries *et al.*, 2010). In this study two groups of psychiatrists were asked to make a number of diagnoses based on case descriptions. In one group, healthcare professionals were asked to think consciously about the information they read in the case description, while the other group performed an unrelated distracter task before making the diagnoses. When compared to the conscious condition, healthcare professionals in the unconscious-processing conditions achieved significantly more correct classifications. Another experimental study found that individuals made better clinical decisions when they were distracted for 3 minutes then when they had to make a decision immediately or if they were given 3 minutes to think consciously about the options (Manigault *et al.*, 2015). They found that participants' decisions were better (i.e., they chose for the most appropriate of four treatments) particularly in situations where the decision task was complex, they are motivated to be correct, and the task has a high level of ecological validity. These results highlight the potential merits of exploring implicit processes underlying healthcare professional behaviour.

Many theories have acknowledged the dual-nature of the human mind (Epstein, 1990; Sloman, 1994; Metcalfe and Mischel, 1999; Smith and DeCoster, 2000; Strack and Deutsch, 2004; Wiers *et al.*, 2007; Reyna, 2008). What follows is an in depth exploration of these dual-process theories and their relationship with habit. An overview of how each of the theories defines habit and how it relates to other constructs within those theories will be presented. Furthermore, the possible relevance to understanding how to make and break habits in health professionals will be explored.

1.5 Dual process theories

1.5.1 *Freud and the unconscious mind*

Although many 19th century philosophers (Nietzsche, 1882; Schopenhauer, 1969; Spinoza, 2002) recognised that actions are partially driven by unconscious mechanisms, the first cohesive theory of the unconscious was developed by the Austrian neurologist Sigmund Freud (Freud, 1953). Before Freud, philosophers and scientists viewed the unconscious as a 'storehouse' for forgotten memories. Freud, however extended this idea by emphasising the dynamic nature of the unconscious (Power, 2000). In his most important work 'The Interpretation of Dreams' (Freud, 1953), Freud proposed a dual process theory which focused on abnormal behaviours. In this theory he argued that the unconscious operates through what he called 'primary process thinking'. Primary process thinking is dominated by the pleasure principle and leads people to seek instant gratification. The primary process is believed to underlie both dreams and psychological symptomatology. This is different from the more logical and realistic mode of operation which he called secondary process (Freud, 1953). Primary processes were believed to undermine attempts of conscious rational thinking. From a Freudian perspective, habit would be placed in the domain of primary processing as it occurs unconsciously and influences behaviour in different aspects of life. Healthcare professionals might for example unconsciously avoid talking about weight management to an overweight patient in order to avoid an uncomfortable conversation.

According to Freud the best method of stopping primary processes from interfering with secondary processing is to make the unconscious *conscious* (Freud, 1953). Thus, from a Freudian perspective, maladaptive expressions of

the unconscious can only be changed through rational and conscious analysis (Epstein, 1994). The conflict between the conscious and unconscious is the central theme in Freud's psychoanalysis. In this form of therapy, patients are asked to explore this conflict by learning about themselves and their unconscious thoughts and desires. One technique that is frequently deployed in psychoanalysis is free association, during which a patient is asked to voice everything that comes to mind without censoring the content of the thoughts. The main critique of Freud's theory is that his idea of the unconscious as a maladaptive system that corrupts rational thinking is inconsistent with more recent evidence that shows that unconscious processes can be functional and adaptive (Epstein, 1994). Freud's techniques to change unconscious processes (e.g. free association) seem unsuitable for changing the behaviour of healthcare professionals, as they take a long time (sometimes years) and require a highly skilled analyst.

1.5.2 ***Fuzzy-Trace Theory (FTT)***

Fuzzy trace theory, also known as the dual process theory of memory, has been applied in cognitive psychology, human development, and social psychology. It has been used to explain phenomenon such as false memory (Reyna and Brainerd, 2002), and medical-decision making (Reyna, 2008). According to FTT, memories are represented in two ways: as verbatim and as 'gist traces'. Gist traces are fuzzy representations of past events (i.e. bottom-line meaning) and are people's preferred mode of processing. For example, healthcare professionals prefer judging risks in terms of high or low, rather than thinking about risks in terms of probabilities (Reyna, 2008). Verbatim representations on the other hand are detailed recollections such as ratio concepts. In contrast to other dual-process models, FFT assumes that decisions based on intuition or gist representations are sometimes superior to decisions based on more computational processing (Reyna, 2008). Whether gist-based reasoning is superior to verbatim-based reasoning depends on the level of expertise and other circumstantial factors. For example, experts often rely on intuitive, gist-based reasoning rather than using verbatim reasoning. One study showed that experts who had to make medical decisions based on gist were superior to novices who had to base their decisions on verbatim processing (de Vries *et al.*, 2010). Importantly, the formation of gist traces

depends on the encoding and storage of verbatim traces. This process of encoding verbatim traces into gist traces may be formalised using specific Behaviour Change Techniques (BCTs) including action planning. After repeating a behaviour in the same context over a certain period of time the new activity should become a gist representation or habit and therefore be performed more effectively.

1.5.3 *Reflective-Impulsive Model (RIM)*

Strack and Deutsch (2004) proposed the Reflective Impulsive Model which describes the interplay of two systems—a Reflective System (RS) and an Impulsive System (IS). The RS is responsible for higher thought processes such as rational thinking and is slow and effortful. The IS is responsible for heuristic judgments and automatic processes and only requires minimal cognitive effort. Habit is represented on the impulsive pathway, which means that the behaviour is triggered by external cues and executed quickly and efficiently. Importantly, the RS can regulate the IS by creating action plans in new situations or when established habits are not working (Strack and Deutsch, 2004). This idea also supports the use of action planning techniques as one has to describe details of when, where and how to act—for example when using a new information leaflet for physical activity advice (Michie *et al.*, 2011).

1.5.4 *Boundary conditions*

Hofmann and colleagues (2008) extended the Reflective-Impulsive Model by describing boundary conditions under which one of the two systems dominates. Such conditions include ego depletion, cognitive load, and alcohol intoxication. Under these conditions the RS may fail to inhibit or override the IS. For instance, if a healthcare professional is recommended to advise a patient with lower back pain to do more physical activity, but instead he/she would usually prescribe opioids, there can be a conflict in behavioural schemas (i.e., generalizations in memory which represent repetitive experiences). Under optimal conditions (e.g. plenty of time, motivated patient) the healthcare professional might advise on increasing physical activity (RS response). If, on the other hand, the healthcare professional is under time pressure and it is the end of the day the RS might fail to inhibit the IS which would lead them to prescribe opioids (IS response).

1.6 Measuring habit

Measuring to what extent healthcare professional behaviour is driven by habit is important both from a theoretical and intervention development perspective. If a clinical behaviour was driven mostly by habit, then strategies to change that behaviour would have to be different to those that target more reflective processes. To assess habit effectively, measures need to capture the main characteristics of habit, which are: automatic impulse generation, impulse (or urges) to perform behaviour, cue-dependency, and the underlying stimulus response association (Gardner, 2014). Below we summarise some of the most common measures of habit used in patient and general population samples, however it is not yet clear whether these measures represent the full range of ways that have been used to assess habit in healthcare professionals. Even though some measures might not capture the full range of characteristics there may be an opportunity to combine certain measures to achieve more valid measurement.

1.6.1 ***Self-reported measures***

The Self-Reported Habit Index (SRHI) (Verplanken and Orbell, 2003) is a tool that measures self-reported perceptions of habit strength for a particular behaviour. The SRHI includes three factors: past behaviour, automaticity, and identity expression. Habit is measured with 12 items on a 7-point Likert scale. The SRHI assumes that we can become conscious of the degree to which our behaviour is habitual by reflecting on the consequences of our actions (e.g. 'I cannot remember brushing my teeth but as I have a minty taste in my mouth I must have brushed them') (Sniehotta and Presseau, 2012; Gardner, 2014). However, one of the limitations of the SRHI is that it does not include cues that are believed to prompt habitual behavior. Sniehotta and Presseau suggested that the SRHI should be adapted to also include cues (e.g. 'Behaviour X in Context Y is something I do automatically') (Sniehotta & Presseau, 2012). Furthermore, it can be adapted to assess initiation rather than execution of actions (e.g. 'Choosing to provide an information leaflet is something I do automatically') (Gardner *et al.*, 2016).

Gardner has proposed to use only those items of the SRHI that focus on the automaticity aspect of habit, which he argues yields a theoretically more sound

measure of habit (Gardner and Abraham, 2009). The Self-Reported Behavioural Automaticity Index (SRBAI) was developed to address the limitations of the SRHI by focusing on the automaticity aspect of habit (Gardner *et al.*, 2012). The SRBAI is a more parsimonious measure of habit and it is more useful for studies that intend to track the development of habit over time (Gardner *et al.*, 2012).

1.6.2 *Implicit measures*

Implicit measures describe a group of experimental measures that can be used to test the cue-behaviour association that underlies habit. These measures are usually administered in a controlled lab-setting and are based on the assumption that habitual responses are more readily accessible than non-habit responses, so that people respond more quickly to cues that are associated to habitual behaviours (Neal *et al.*, 2012). Although these tests overcome some of the limitations of the self-reported measures (e.g., by assessing automatic impulse generation and the underlying stimulus response association) they can only be used under controlled conditions which make them less suitable for field studies.

1.6.3 *Limitations of self-reported and implicit measures*

There are numerous problems with the measurement of habit. If habit is by definition an automatic and unconscious process, then one can expect that people have little access to the process that initiates a habitual action. As a consequence, there is a chance that people could make false judgments on self-reported measures that ask them to what extent their behaviour is automatic (Nisbett and Shanks, 1977). Implicit measures can offer a good alternative as they apparently tap into the cue-response nature of habit, however their validity has also been questioned (Blanton *et al.*, 2009). As such, there does not appear to be an ideal way of measuring habit currently, but rather usage should be based on the context of the research and limitations acknowledged when using current measures of habit.

The following paragraph describes of how a multiple goal perspective of behaviour change could contribute to current theorising about behaviour change in healthcare professionals. In addition an overview of how this multiple goal

perspective links to habit theory is described as well as how the two approaches can be integrated.

1.7 Multiple goals approach

Many theories of behaviour change portray goal-directed behaviours in isolation from one other (e.g. TPB) (Fishbein and Ajzen, 1975; Ajzen, 1991). In the context of clinical practice healthcare professionals often have to navigate multiple goal-directed behaviours. Some goals are compatible so that the pursuit of one fosters the pursuit of another (goal facilitation). Other goals hinder one other (goal conflict). One prospective study explored whether goal facilitation/conflict could add to the prediction of healthcare professionals' behaviour, alongside constructs from the Theory of Planned Behaviour (Presseau *et al.*, 2011). An exploratory study including forty-four primary care physicians and nurses showed that the addition of goal facilitation and goal conflict explained additional variability (5.8% and 8.4% respectively) in reported provision of physical activity advice. These theoretical insights could be used to inform strategies to promote the implementation of new behaviours. For example, if one would like to integrate advice on salty foods and their effects on blood pressure, a doctor might opt to do this immediately following the measurement of blood pressure (goal facilitation).

This perspective of behaviour change can be integrated with current theorising about habit. There is limited time and resources to engage in all our goals (Presseau *et al.*, 2011); if it is possible to use behaviour change strategies to increase automaticity of certain behaviours, then this would free up mental resources that could be invested in other activities (Fleig *et al.*, 2014).

To assist healthcare professionals with the implementation of new behaviours, it is important to identify effective behaviour change strategies. These strategies should also support healthcare professionals with managing multiple demands by increasing goal facilitation while avoiding goal conflict. One potential solution could be the use of planning interventions to support healthcare professionals with these challenges.

1.8 Creating and breaking habit in healthcare professionals

1.8.1 *Implementation intentions*

When considering dual-process models it could be argued that to strengthen the impulsive pathway of behaviour or to create a habit, one should first engage in more complex behavioural encoding or define consciously when, where and how to perform a particular behaviour. Implementation intentions (specific if-then plans) could be an effective intervention strategy to facilitate this shift/change in cognitive processing. The typical structure of an implementation intention is “If situation X is encountered, then I will perform the goal-directed response Y” (Gollwitzer, 1999). An example for healthcare professionals could be “If a patient reports having problems with the self-management of diabetes, then I will print out a relevant information leaflet”. Before an implementation intention can be formed one needs to first identify the ‘if-part’ or situational cues (e.g. patient talking about problems with self-management) to which a desired goal-directed behaviour (e.g. providing an information leaflet) or ‘then-part’ can be linked. A meta-analysis of almost one hundred studies demonstrated a medium-to-large effect of implementation intentions on goal attainment (d = .65) (Gollwitzer and Sheeran, 2006).

1.8.2 *Coping planning*

Action planning helps individuals to act upon their intentions. However, automatic responses, competing goals, and actual demands (e.g. next patient waiting) can conflict with the execution of an action plan. In this situation, coping planning can help to deal with these problems by focusing on barriers to goal attainment. When making a coping plan an individual specifies how to deal with these barriers in advance (Sniehotta *et al.*, 2005). For example, a healthcare professional could form a coping plan to help deal with stressful times when there are many patients to see and time is limited. This could be, ‘If I want to provide a patient with weight management advice, but I have other patients to see and the clinic is running late, then I will provide the patient with an information leaflet that provides the necessary information and invite them back to discuss it’.

By specifying how to best deal with barriers, individuals can attain their goals even in situations in which barriers and obstacles hinder intended actions or

trigger contra-intentional behaviour (Sniehotta *et al.*, 2005). Coping planning may be effective in helping healthcare professionals to stop using existing, habitual behaviours (e.g. non evidence-based practices) in times when self-regulatory resources are low. This idea is consistent with dual-processing research on boundary conditions (Hofmann *et al.*, 2008). According to this theory we are more likely to use reflexive processing in times when cognitive capacities are low (boundary conditions), and boundary conditions are comparable to barriers in coping planning.

A systematic review of 11 randomised controlled trails found that coping planning interventions were effective at changing health-related behaviours when participants received help with the process of forming coping plans (Kwasnicka *et al.*, 2014). Furthermore, the combination of action plans and coping planning seemed to be more effective than using action planning alone. Although action planning and coping planning seem to be effective for changing health behaviour, they remain largely untested for changing healthcare professional behaviour.

1.9 Quality gaps in type 2 diabetes care

There has been a significant increase in the incidence of type 2 diabetes over the past twenty years, with an increasing trend of diagnosis seen in those aged under 40 years (McGlynn *et al.*, 2003; Holden *et al.*, 2013). There are various reasons for this increase overall including an ageing population and increasing prevalence of obesity (Yach *et al.*, 2006). Although there are national guidelines for the type 2 diabetes care (e.g. prescribing to control blood pressure and providing weight management advice) (NICE, 2009), there is evidence to suggest that healthcare professionals do not always adhere to these guidelines (Schuster, 1998; Grol, 2001). It is commonly observed that the adoption of research findings that encourage effective, efficient, safe and patient-centered care into daily practice is slow (Wensing *et al.*, 2005). One of the reasons for this is that it often takes healthcare professionals time to learn and adapt new behaviours and activities and replace existing integrated practices (Grol *et al.*, 2005).

Similarly, a number of published reviews have shown that the production and dissemination of guidelines has only been moderately effective in improving care, and that there is much room for improvement (Grimshaw and Russell, 1993; Grimshaw *et al.*, 1995; Grol, 2001; Grimshaw *et al.*, 2006; Lugtenberg *et al.*, 2009). A national audit of diabetes care in the UK found that the proportion of patients receiving more than six of the nine recommended elements of diabetes care was under 90% and the proportion of those receiving all nine was under 5% (National Audit Office, 2012).

The result of these quality gaps is that patients fail to receive guideline recommended care supported by the latest scientific evidence. Consequently this could lead to sub-optimal self-management practices. A study of almost seven thousand patients in the USA found that on average less than 60% of patients received care according to the best evidence (McGlynn *et al.*, 2003; Asch *et al.*, 2006). Another study found that only 23% of people with diabetes (N = 1950) at an outpatient clinic managed to attain the target value of HbA1c; adherence to national diabetes care guidelines (e.g., examining feet, physical exercise advice, and weight measurement) across 13 hospitals was on average 64% (Dijkstra *et al.*, 2004).

A recent report predicted that the National Health Service (NHS) annual spending on diabetes in the UK will increase from £9.8 billion to £16.9 billion over the next 25 years (Hex *et al.*, 2012). This rise means that the NHS will be spending 17% of its entire budget on the condition. Indeed considerable annual resources are spent on research and development of treatment guidelines, however the translation of this work into practice is often slow (Grimshaw *et al.*, 2012). To prevent these growing costs and to utilise existing resources more effectively, there is a need to develop more effective strategies to help healthcare professionals integrate new and existing evidence into daily practice for the care of their patients (Grol *et al.*, 2005).

1.10 Information prescription

A recently developed information prescription, the Diabetes UK information prescription (DUK IP) includes evidence-based techniques from behavioural science to enhance the delivery of a risk perception changing, goal setting,

action planning and coping planning intervention for people with diabetes (see Chapter 2 and 3). Three DUK IPs were developed that aim to facilitate the provision of self-management advice relating to three type 2 diabetes related topics/clinical outcomes (HbAc1, cholesterol, and blood pressure). Specifically, the DUK IPs were developed to encourage patients to manage their own diabetes. DUK IP are short (one side of A4), easy to read and provide clinically accurate information that supports healthcare professionals and people with diabetes to make decisions together about the treatment and self-management of guideline recommended health targets (i.e., HbA1c, cholesterol, and blood pressure).

The DUK information prescriptions are targeted at individuals with an increased risk of developing complications. They start with a short section including clinically accurate information about the three health targets (i.e., HbA1c, cholesterol, and blood pressure) written in plain English. This section is followed by a checkbox list of health behaviours that patients can adopt (e.g., reducing the size of your portions and cut down on fatty and sugary foods to keep a healthy weight). An ‘agreed action plan’ section at the bottom of the DUK IP allows healthcare professionals and people with diabetes to further personalise the chosen health behaviours by specifying ‘when, where, and how’ the behaviour is to be adopted.

To support the implementation of the information prescriptions Diabetes UK designed a number of implementation strategies. To ensure that people at high risk are reached, healthcare professionals receive an electronic pop-up alert when they open a patients’ medical record. An alert appears if a patient could benefit from information relating to specific aspects of their diabetes management (i.e. if clinical test results fall outside of NICE recommended targets). Once a healthcare professional receives a pop-up alert he/she can access the appropriate IP with the patient’s information from the medical records automatically completed. Continuity of care is intended to be achieved through automatic saving of the completed IP in the patient’s electronic medical records so that past goals agreed can be accessed quickly in future consultations. Automatic retention of the patient’s information and goals can decrease workload and prevent any entry duplication.

The DUK IP was developed by a multidisciplinary team consisting of people with type 2 diabetes, nurses, general practitioners, consultants, and health psychologists co-designed the DUK IP. During the course of two meetings the team agreed on the design and clinical content of the new tool. The author of this thesis was particularly involved in the development of the behaviour change component of the DUK IP. In the first version of the tool patients and clinicians had to set an outcome goal (e.g. level of HbA1c level). However, it was advised that that it would be more effective if patients could set behavioural goals (e.g. reduce the amount of salt in dinner). Furthermore, advice was provided on how to formulate an action plan that would promote goal attainment. Specific, relevant examples were provided on how this can be done in people with type 2 diabetes. It was explained that the formulation of such a plan would have to include details about when, where and how the behavioural goal should be attained.

The following describes the literature and evidence supporting the DUK IP, which justifies its appropriateness for implementation in primary care settings. As the DUK IP focuses on patients, this brief literature overview focuses on evidence supporting key elements of the DUK IP that target patients. Some of these include planning strategies directed at patient behaviour change; indeed there is a rich literature on the use of planning for health behaviour change in patients. It is in part on the basis of this strong evidence in patient populations that this thesis investigates the potential utility of planning interventions for healthcare professional behaviour and habit, and therefore casting this within the broader patient-focused planning literature serves to justify the DUK IP's evidence base and set the stage for considering planning interventions for healthcare professionals.

1.11 Goal setting and planning interventions in type 2 diabetes

There is a substantial amount of evidence to support the effectiveness of planning interventions for people with type 2 diabetes. A systematic review assessed the effectiveness of interventions and theory-based behaviour change techniques on physical activity (PA), HbA1c, and BMI in adults with type 2 diabetes (Avery *et al.*, 2012). Meta-analysis of 17 randomised controlled trials (RCTs) published up to January 2012 showed statistically significant increases

in objective and self-reported PA/exercise, including clinically significant improvements in HbA1c. A series of moderator analyses identified that the setting and reviewing of behavioural goals and providing information about when, where and how to be physically active (action planning) were associated with clinically significant improvements in HbA1c. Another systematic review looked at the effectiveness of intervention components that promote dietary and/or physical activity behaviour change in order to prevent type 2 diabetes (Greaves *et al.*, 2011). The analysis of 30 eligible studies showed that the inclusion of well-defined/established behaviour change techniques (e.g. goal-setting) was related to an increase in the effectiveness of the interventions that targeted change in diet and physical activity. More recently, Hankonen and colleagues (2014) assessed the effectiveness of a theory-based intervention, in which they taught 239 people with type 2 diabetes a range of behaviour change techniques (BCTs). Participants recorded their use of BCTs over a 1 year period. The results showed that participants who set goals (e.g. to eat a low-fat diet) and made an action plan (when, where and how to perform desired behaviour) lost significantly more weight (as measured by the body mass index) than those who did not.

1.12 Patient involvement in decision-making

A second objective of the introduction of the DUK IP was to increase patient involvement in decision-making about diabetes self-management. There is some evidence to show that involving people with type 2 diabetes in decision making during primary care encounters leads to improvements in a range of clinical outcomes. In a prospective study conducted in 5 family physician offices, patients were asked to rate the participatory decision-making (PDM) style of their physician and report their level of activation and medication adherence at baseline and 12 month follow-up (Parchman *et al.*, 2010). The results showed that patient activation was associated with medication adherence, which in turn was associated with change in haemoglobin and LDL cholesterol levels. Another study looked at how communication between patients and clinicians using collaborative goals and treatment plans could be used to improve hypertension control in routine diabetes care (Naik *et al.*, 2008). In a sample of 566 older adults with diabetes mellitus there were three communication factors that were found to have significant associations with

hypertensions control. Collaborative goal setting and patients' input to the treatment progress predicted hypertension control independent of medication adherence.

Collectively the evidence presented suggests that the translation of research into practice remains problematic, but that theories of behaviour may provide methods and frameworks that can support more effective research translation through healthcare professional behaviour change. Thus far, theory-based approaches to understanding and changing healthcare professional behaviour have focused on the reflective process that underlies clinical behaviours, but there seems to be a lack of research on implicit processes such as habit.

1.13 Research questions and overview of the thesis

The overarching aim of the research conducted for the purpose of this PhD thesis is to advance understanding of how the concept habit relates to healthcare professional behaviour, and to facilitate the design of interventions to create and break habitual clinical behaviours.

This research has four main research questions:

1. Can the implementation of a new intervention (i.e. the DUK IP) be understood from a dual process/multiple goals perspective?
2. Is a web-based planning intervention (using action planning and coping planning) effective at promoting the uptake of a new intervention in clinical practice (i.e. the DUK IP)?
3. Does habit mediate the relationship between planning (action planing and coping planning) and healthcare professional behaviour (e.g., prescribing, advising and examining)?
4. What is the strength of association between habit and healthcare professional behaviour?

The following chapters aim to answer each of the aforementioned research questions.

Chapter 2 presents theory-based semi-structured interviews conducted with healthcare professionals who had been piloting the DUK IP with people with type 2 diabetes in clinical practice. Interviews were analysed using content

analysis and a dual process and multiple goals approach was applied to better understand healthcare professionals' uptake of the DUK IP. Healthcare professionals reported that it took them one to three months until they had formed a habit of using the DUK IP. Furthermore, electronic pop-up reminders in the electronic patient records were perceived to have facilitated the use of the information prescription.

Chapter 3 describes a 2 x 2 factorial randomised controlled trial testing the effectiveness of a web-based action and coping planning intervention to improve the uptake of the DUK IP. The theory-based approach to intervention design and evaluation are described in detail. Furthermore, details are provided on how theory-based process evaluations can be conducted alongside the trial. Unfortunately, the utilised recruitment procedure was not acceptable and the trial had to be stopped pre-maturely.

Chapter 4 presents a secondary analysis of the large national Improving Quality of Care in Diabetes (iQuaD) study dataset (Eccles *et al.*, 2011). iQuaD utilised a correlational design with six nested sub-studies. The study included GPs and nurses (n = 427) from 99 UK primary care practices who completed measures of action planning, coping planning and habit at baseline and then self-reported their performance of guideline-recommended advising, prescribing and examining behaviours 12 months later. Bootstrapped mediation analyses were used to test the indirect effect of action and coping planning on healthcare professionals' clinical behaviour via their relationship with habit. All 12 bootstrapped mediation analyses showed that the positive relationship between planning (action and coping planning) and healthcare professionals' clinical behaviour operated indirectly through habit.

Chapter 5 presents a systematic review and meta-analysis assessing the strength of association between habit and healthcare professional behaviour. Electronic databases were systematically searched for studies reporting correlations between habit and any healthcare professional behaviour and meta-analytical methods were utilised to assess the overall habit-behaviour relationship across behaviours. Sub-group analysis further assessed whether the observed habit-behaviour relationship varied depending on the type of behaviour measure used (objective vs. self-report) and type of behaviour

assessed (e.g., prescribing, examining, and advising). The systematic review identified nine eligible studies involving 1,975 healthcare professionals. A combined mean r_+ of 0.35 was observed between habit and healthcare professional behaviour.

Chapter 6 summarises the findings in this thesis across the four studies, discusses their wider implications in terms of theory development and integration and proposes possibilities for future research.

Chapter 2. Exploring the role of competing demands and routines on the implementation of a self-management tool for type 2 diabetes: A theory-based interview study

2.1 Abstract

Background: The implementation of new medical interventions into routine care involves healthcare professionals adopting new and changing existing clinical behaviours. Healthcare professionals must often perform multiple behaviours, many of which may be prompted automatically by contextual factors (e.g., prompts and cues). Most predominant theory-based approaches to understanding health professionals' use of new interventions fail to consider the impact of impulsive influences and how the myriad of competing demands for their time may influence uptake. The current study aimed to apply a dual process and multiple goal approach to understanding health professionals' implementation and use of a new self-management tool in diabetes care.

Methods: Following Diabetes UK's national release of the 'information prescription' (DUK IP; a self-management advise tool targeting: cholesterol, blood pressure and HbA1c) in January 2015, we conducted semi-structured interviews with 13 healthcare professionals (GPs and nurses) who had started to use the DUK IP during consultations to provide self-management advice to people with type 2 diabetes. A theory-based topic guide included pre-specified constructs from a previously developed logic model. Specifically, we elicited healthcare professionals' views on *outcome expectations, self-efficacy, intention, action* and *coping planning, habit, goal priority, goal conflict and goal facilitation*. All interviews were audio recorded and transcribed verbatim and all transcripts were double coded and analysed (using content analysis) independently.

Results: The majority of healthcare professionals interviewed reported strong intentions to use the DUK IP and having formed a habit of using them within one to three months. Cues in the electronic patient records that promoted healthcare professionals to use the DUK IP were perceived to facilitate the use of the tool. Other factors that facilitated the use of the DUK IP included additional administrative support and having been part of the development

process of the DUK IP. Factors that conflicted with the use of the DUK IP included existing pathways of providing self-management advice.

Conclusion: Data suggests that constructs from dual process and multiple goals approaches are useful to understand the implementation of new medical interventions such as the DUK IP.

2.2 Introduction

Translating research evidence into improved care in routine practice is difficult and there is a wealth of research to demonstrate that there are gaps in the quality of care provided to patients (Grol, 2001). For example, a study conducted in the USA that included almost seven thousand patients found that on average less than 60% of patients received care that was in line with guidelines of best practice (Asch *et al.*, 2006). The field of implementation science is concerned with promoting the integration of research findings and evidence into healthcare policy and practice (Eccles *et al.*, 2009) by understanding the range of factors that can prevent or enable improvements in healthcare practices (Wensing *et al.*, 2011). A better understanding of such factors and their interactions across a range of healthcare practices has the potential for informing the design of effective implementation interventions (Wensing *et al.*, 2011). Behavioural theories can provide a useful lens through which implementation can be understood by describing relationships between factors that influence practice, many of which have been tested successfully in both patient (Silva *et al.*, 2010) and healthcare professional populations (Eccles *et al.*, 2005; Godin *et al.*, 2008).

Predominant behavioural approaches in implementation science view healthcare professionals' behaviour as the result of a reflective decision-making process (Godin *et al.*, 2008). For example, the Theory of Planned Behaviour (TPB; Ajzen, 1991) suggests that the strength of a person's *intention* (or motivation) is viewed as the most important determinant of behaviour. Two important predictors (amongst others) in Social Cognitive Theory (SCT) are *outcome expectancies* (similar to *attitudes* in the TPB) and *self-efficacy* (Bandura, 1977). *Outcome expectancies* refer to a persons' estimation of what the anticipated consequences of a given behaviour are (Bandura, 1977). *Self-efficacy* refers to a person's perceived capability to perform a behaviour in the face of anticipated barriers to behaviour (Bandura, 1977). The consistent finding that intention does not always translate into action (i.e., *intention-behaviour gap*) (Sheeran, 2002; Sniehotta *et al.*, 2005) has led to the development of theories that are specifically concerned with volitional cognitions such as *action*

planning and *coping planning* (Health Action Process Approach [HAPA]; Schwarzer *et al.*, 2011). *Action plans* are specific plans of when, where and how to perform a behaviour and *coping plans* deal with anticipated barriers to the behaviour (Sniehotta *et al.*, 2006; Kwasnicka *et al.*, 2013). Social cognitive and volitional models of behaviour have made a large contribution to implementation science (Michie *et al.*, 2005) and have successfully guided both the design and evaluation of effective interventions (Hardeman *et al.*, 2002).

However, although, social cognition and volitional models provide useful insights into how behaviour is initiated, they do not sufficiently account for the role that implicit processes such as habit play in determining healthcare professionals' behaviour. *Habit* can be defined as a learned tendency to perform a behaviour automatically in response to a specific cue in the situational context (Gardner, 2014). For example, the sight of a soap dispenser in a clinical setting (contextual cue) may prompt a healthcare professional to engage in hand washing without the need for explicit decision-making every time (automatic response). Taking into account that much of healthcare professionals' behaviour might be contingent to cues (e.g. electronic reminders to prompt clinical actions) there has been a call for greater consideration of habit in behavioural theories used in implementation science (Nilsen *et al.*, 2012).

The suggestion that healthcare professionals' behaviour is driven by both reflective (e.g. intention) and impulsive (e.g. habit) processes is consistent with dual process models (Benner, 1982; Strack and Deutsch, 2004). According to these models there are two systems that operate in parallel that determine behaviour—a reflective and an impulsive system (Deutsch and Strack, 2008). The reflective system involves slow and effortful decision-making that operates under full conscious awareness (Deutsch and Strack, 2008). This process is consistent with most contemporary theories of behaviour and there is considerable research suggesting the importance of reflection (Godin *et al.*, 2008). The impulsive system involves quick and efficient processes that operate outside a person's awareness (Deutsch and Strack, 2008). This impulsive system includes automatic action tendencies such as habit. A study involving 417 primary healthcare professionals (GPs and nurses) tested whether a dual process model could predict the utilisation of six underperformed prescribing,

advising and examining practices in diabetes care (Deutsch and Strack, 2008). This study found that measures of both reflective and impulsive processes at baseline predicted healthcare professionals' provision of prescribing, advising, and examining behaviours at 12 months follow-up (Presseau *et al.*, 2014).

Although there is quantitative research evidence to demonstrate the importance of habit as an important predictor of healthcare professional behaviour (Presseau *et al.*, 2014), there is a lack of theory-based qualitative research. Qualitative research is key as it can help to help with triangulation and with validating findings obtained using quantitative methods (e.g., questionnaires) (O'Cathain *et al.*, 2007; Moore *et al.*, 2015). In regards to habit formation specifically qualitative methods can add context to the quantitative literature to better understand how healthcare professionals form a new habit (and break old habits) and how habit subsequently impacts on behaviour. One qualitative study looked at antimicrobial prescribing within hospitals and found that healthcare professionals identified habit as one of the determinants of their prescribing behavior (Charani *et al.*, 2013). Another study found that a lack of positive role models amongst hospital co-workers lead to poor hand hygiene habit in future students (Erasmus *et al.*, 2009). However, both studies did not incorporate questions regarding habit in their interview topic guides and they did not make explicit use of theories that would explain how habit had formed or how it influenced healthcare professionals' behaviour. One qualitative study that did take a theory-based approach and that incorporated questions on habit/routines investigated barriers and facilitators to hand hygiene in healthcare professionals (Dyson *et al.*, 2011). This study showed that habit/routine (i.e., an automatic response to cues) was a facilitator of healthcare professional hand hygiene behaivour. The study also compared participants' responses when using a theory-based schedule vs non-theory based question schedule. The theory-based schedule lead to a greater frequency of responses regarding routine/habit when compared to a schedule that was not based on theory.

Another qualitative study looked explicitly at habit formation in people who were enrolled in a weight loss intervention (Lally *et al.*, 2011). The weight loss intervention specifically targeted habit formation by providing people with tips that would promote context-dependent repetition of health behaviours (Lally *et al.*, 2011). The study showed that participants initially experienced the newly

adopted health behaviours as effortful, but as they repeated the behaviours automaticity increased and initiation of the new behaviours became less effortful (Lally *et al.*, 2011). The study further suggested that the selection of effective cues to support behavioural repetition was essential for habit to form (Lally *et al.*, 2011).

Recently, there have been calls for considering the role of competing demands as a way of operationalizing time-related barriers. Research on competing demands acknowledges the impact of *conflicting goals* and *priorities* on the pursuit of new behaviours (Presseau *et al.*, 2010; Presseau *et al.*, 2011). Healthcare professionals often pursue multiple goals (e.g., prescribing medication whilst maintaining a rapport with the patient), however the pursuit of any specific goal may interfere with pursuing another. For example, by taking up time available or due to incompatibility (e.g., taking blood pressure readings whilst examining a patients' feet) or facilitate pursuing another, for example instrumentally (e.g., providing advice on diet can lead to setting goals for weight loss). There is quantitative and (Presseau *et al.*, 2011) qualitative research evidence (Presseau *et al.*, 2009) demonstrating the importance of going beyond single-behaviour approaches by acknowledging the impact of multiple goal pursuit. In a qualitative study utilising theory-based semi-structured interviews, healthcare professionals readily related their other goal-directed behaviours with having a facilitating and interfering influence on two evidence-based clinical behaviours (i.e., providing physical activity advice and prescribing to reduce blood pressure) (Presseau *et al.*, 2009). A better understanding of determinants of healthcare professionals' behaviours has the potential to improve the implementation of interventions that aim to improve the care provided to patients.

Type 2 diabetes is a worldwide epidemic that affected approximately 415 million adults in 2015 (Chen *et al.*, 2012). The number of diagnosed cases in the UK has more than doubled from 1.4 million in 1996 to 3.5 million in 2015 (Holden *et al.*, 2013). The recognition that poor management of type 2 diabetes can lead to serious complications (e.g. cardiovascular disease, morbidity, and accelerated mortality) has led to the development of effective interventions that can halt progression and even reverse the condition (Steven *et al.*, 2016) through health behaviour change (Avery *et al.*, 2012; Avery *et al.*, 2014). Furthermore, a large

systematic review reported that self-management training in type 2 diabetes has positive effects on a range of health outcomes such as sustained glycemic control, cardiovascular disease, and quality of life (Norris *et al.*, 2001). As a result of this evidence, an update in clinical practice guidelines and quality standards (NICE) has called for more support with self-management behaviours in patient populations (McGuire *et al.*, 2016). To support the successful implementation of NICE guidelines healthcare professionals may require support to provide self-management advice and an evidence-informed resource could help them deliver this evidence-based care.

Diabetes UK collaborated with Newcastle University to develop an 'information prescription' for type 2 diabetes (Potthoff *et al.*, 2016). The DUK IP is a clinical tool developed to help healthcare professionals and people with type 2 diabetes to make decisions together about the treatment and self-management. In the first instance, Diabetes UK released three different IP covering three important diabetes-related health targets: blood pressure, cholesterol, and HbA1c (see Appendix A). This intervention draws upon evidence-based behavioural science to provide a mode of targeting risk perception and supporting goal setting, action planning and coping planning of people with type 2 diabetes (Greaves *et al.*, 2011; Avery *et al.*, 2012; Hankonen *et al.*, 2014). DUK IPs are installed on primary care practice computers and automatically populated with test results of people with type diabetes in relation to three clinical conditions, cholesterol, blood pressure and HbA1c.

The information prescriptions went live in a subset of primary and secondary care practices in 2014 and healthcare professionals started piloting them with people with type 2 diabetes. The current study aimed to capture and understand healthcare professionals' experiences with the new tool in terms of reflective, impulsive and multiple goal processes. The following research questions investigated views of healthcare professionals who have started to use of the DUK IP in terms of: 1) How motivated were healthcare professionals to use the DUK IP? 2a) How long did it take healthcare professionals to form a habit of to use the DUK IP? 2b) What contextual cues and prompts were healthcare professionals aware of that precede their use of the DUK IP? and 3) What other clinical activities (e.g. provision of information materials) competed with or facilitated the use of the new tool?

2.3 Methods

2.3.1 *Sampling and recruitment*

We aimed to recruit a purposive sample of primary healthcare professionals who had experience using the DUK IP. Purposive sampling involves selecting people from a population on a non-random basis with the aim to recruit a sample with a variety of characteristics. Participating healthcare professionals were recruited from primary care practices throughout the UK through a gatekeeper at Diabetes UK. We aimed to recruit healthcare professionals in different roles (e.g. GPs and nurses) and with different levels of experience to obtain a range of different perspectives. Our target sample size was a minimum of 13 or until data saturation was reached, in line with published guidance (Francis *et al.*, 2010). Participating healthcare professionals included both those who were involved in the development and piloting of the DUK IP and those who had no involvement in the development process. The research protocol was approved by the Newcastle University Faculty of Medical Sciences Ethics Committee (Application No: 00849) (see Appendix B) and research assurance was provided by North of England Commissioning Support Unit (see Appendix C).

2.3.2 *Data collection*

Theory-based semi-structured interviews were conducted face to face or by telephone. A theory-informed topic guide was used with each interview (see Appendix D). This was based on a logic model (see Figure 1) developed from a previous predictive study with healthcare professionals who were providing care to people with type 2 diabetes (Presseau *et al.*, 2014). The topic guide included pre-specified prompts to elicit information on specific theoretical constructs included in the logic model. Specifically, we elicited healthcare professionals' views on *outcome expectations, self-efficacy, intention, action* and *coping planning, habit, goal priority, goal conflict and goal facilitation*. The topic guide was piloted with three public health researchers at Newcastle University and with one GP. The pilot indicated that interviews would take approximately 20 minutes. After obtaining signed consent from participating healthcare professionals, interviews were digitally recorded. All interviews were conducted by SP from 5 March to 11 November 2014.

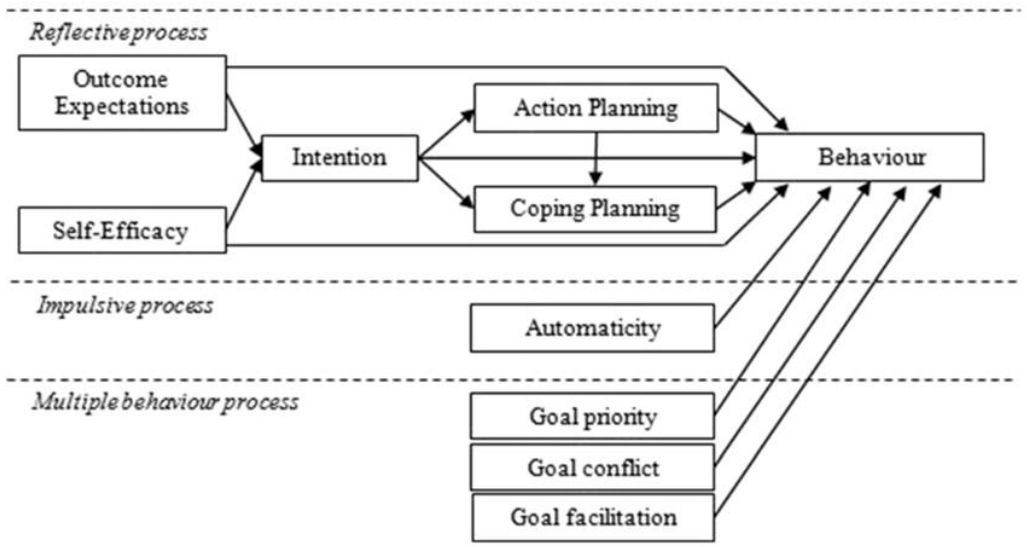


Figure 1 Process model of the topic guide used to facilitate interviews

2.3.3 ***Analysis***

All semi-structured interviews were audio recorded and transcribed verbatim. A coding manual for use with NVivo 7 was created, including definitions and coding instructions (see Appendix E) to ensure researchers involved in the analysis process coded transcripts consistently. Directed content analysis (Hsieh and Shannon, 2005) was used to analyse interview transcripts. The predefined theoretical determinants from the topic guide were used as a guide for initial coding of the qualitative data generated, and further sub-themes were created by coders. Two researchers (SP and MB) independently coded two interview transcripts by selecting and arranging data in to predefined categories. Following this first stage of coding the researchers met to compare the coded passages on their printed transcripts. Disagreements in the interpretation and coding of the transcripts were discussed until all discrepancies were resolved. The next stage involved one researcher (SP) coding all remaining transcripts and the second researcher (MB) coded segments that were highlighted by SP. Bootstrapped estimates of Krippendorff's alpha were calculated for each transcript to determine inter-rater reliability across all coded constructs (5000 bootstrapped samples; Hayes and Krippendorff, 2007). Krippendorff's alpha is the preferred method of determining the degree of agreement achieved between coders and is most commonly used in content analysis (Hayes and Krippendorff, 2007).

2.4 Results

2.4.1 *Participants*

A total of 14 healthcare professionals from 13 different practices across the UK were recruited. Eight of the healthcare professionals (including 5 GPs, 2 nurses, and 1 consultant diabetologist) were directly involved either in the development and/or the piloting of the new tool during its initial roll-out and the remaining five were independent of this developmental and piloting process (including 1 pharmacist prescriber, 1 GP, and 3 nurses). One interview was lost due to file corruption of the audio recording prior to transcription. Healthcare professionals reported a median of 18 years (range 8-35 years) experience of working with patients in primary and secondary care. Healthcare professionals had been using the DUK IP for a median of 6 months (range 2-12) prior to being interviewed.

2.4.2 *Interrater reliability*

Krippendorff's alpha over all constructs ranged from .52 to .88 with most alphas exceeding acceptable cut-off levels of .67 (Hayes and Krippendorff, 2007) indicating satisfactory agreement between coders.

2.4.3 *Reflective process*

Behaviour

An overview of illustrative quotes for all themes is presented in Table 1. There was considerable variability in healthcare professionals' self-reported frequency of using the new tool with people with diabetes that they had consulted during the week prior to the interview. For example, 'I would say I print it off a couple of times a week [2 out of 20 patients]' (ID8); 'Oh, roughly I would say probably 20 a week probably [20 out of 40 patients]' (ID13), 'They all get one, for Type 2 [10 out of 10 patients].' (ID5).

Outcome expectancies

Improved interaction. The majority of the healthcare professionals observed that using the new tool helped them to improve their interaction with their

patients. Healthcare professionals thought that the new tool helped them to structure their consultation:

> *'It gives me an introduction, an opening conversation I can have with the patient. It's something it can keep a consultation structured but it also allows the patients to think about things.' (ID3)*

Improved patient outcome. Healthcare professionals reported that they thought the information in the tool helped their patients to feel more empowered and in control of their condition:

> *'So that empowers them to know a bit more about their condition and what they're aiming for rather than just taking tablets.' (ID7)*

Healthcare professionals reported that the info-graphs (see Appendix A) that depicted what it meant to have high blood pressure, cholesterol or blood sugar, helped raise their patients' risk perception and thereby prompting behaviour change:

> *'I think a picture speaks a thousand words. So that is very helpful for people to see why they should do a behavioural change, because they can actually see the blood vessel getting furred up.' (ID12)*

Healthcare professionals also thought that the new tool would help their patients to better understand their condition and thereby increase their confidence to self-manage:

> *'So it means they're able to go home and compare their figures on this to the previous one, and I think that can give them the confidence to say yes, I am doing right, I am getting there.' (ID14)*

They further reported that the new tool prompted patients to form effective action plans that would help them to reach their behavioural/clinical goals:

> *'It clarifies everything to them so they understand what's their goals, where they are currently and where we want them to get to, and it just clarifies the actions they're going to be taking.' (ID13)*

Lastly, healthcare professionals reported that they thought the agreed targets for behaviour change and for reaching the clinical goals would act as a reminder for the patient:

> *'It is an aide-memoire for the person with diabetes.' (ID4)*

Self-efficacy

Barriers. Healthcare professionals reported the following patient-related barriers to the use of the new tool: multimorbidity (e.g., heart disease, rheumatoid arthritis, and knee pain), illiteracy, dexterity, visual problems, dementia, and lack of engagement:

> *'We have a lot of patients who have comorbidity so they're not just diabetic but they also have heart disease and rheumatoid arthritis or whatever, so all of those things need sorting out so you might decide that actually there's too much to do in one go.' (ID2)*

Contextual barriers reported included lack of time and difficulties with the installation of the information prescriptions on practice computers:

> *'I think that was the biggest barrier was the installation, because I'm fairly good at IT, I've devised an audit tool for CKD [chronic kidney disease] and Diabetes which I've had published and stuff, so I'm not too bad on EMIS web, but I did really struggle just to get this.' (ID9)*

Healthcare professionals reported low levels of self-efficacy when it came to dealing with IT-related problems and often had to seek advice to get the new tool installed on the computer system:

> *'And, I think, if it wasn't for the fact that we have somebody fairly specific administration team that helps with IT I might have given up at that point.' (ID9)*

Intention

With the exception of one, all healthcare professionals were motivated to use the information prescriptions in their practice with patients with diabetes.

'At the moment, very [motivated], because it's a relatively new tool, and I think they're good' (ID8)

One healthcare professional reported low intentions to use the new tool, due to other competing practices that they felt were already working well:

'I'm probably not as motivated as others because of the tools I've already devised myself' (ID9)

Healthcare professionals reported a range of situations in which they were least motivated to use the new tool, including patient-related situations:

'If a patient has come in, the consultation, if it has been around a particularly sensitive topic or emotional topic, a bereavement it wouldn't be appropriate to be talking about control of their diabetes at that stage' (ID4)

And context-related situations:

'One patient I gave it to her and she said I really don't know how to decipher this. I lost one of my children. But she's not come back so I think people who English is not their first language or they find it difficult to read, they will have difficulty in engaging with this.' (ID2)

Action planning

A minority of healthcare professionals reported having a clear plan for when, where and how they would use the new tool with their patients. The patient asking for further diabetes-related information was one opportunity during which healthcare professionals used the tool:

'When the patients come in and they ask can you tell me what my latest diabetes control blood test was like, that's when I'd then bring in that one [information prescription]' (ID11)

A further opportunity for healthcare professionals to use the new tool was related to the time in the consultation, with the end of the consultation being a preferred time for using the tool:

'And it is at the end bits gathering all the information, this is where we think you are, and have a look at this, what do you think you can do to help' (ID8)

Coping planning

Healthcare professionals sought help from relatives and translators in situations where their patients were unable to understand the information presented on the prescriptions:

'I have an interpreter that works with me in my community clinic, and some family members come but I've always got an interpreter' (ID11)

They also made use of the info-graphs to explain the information to non-native speakers:

'A lot of my patients are from different countries so English is not their first language, so I find that this is, the picture, is very easy for them to understand' (ID3)

In situations where healthcare professionals encountered contextual barriers (i.e. lack of time) they either deferred use of the new tool to a later time or they asked a diabetes specialist nurse to discuss the content with the patient:

'You park that and say let's do that another day or come and see the nurse another day and do that with her.' (ID12)

2.4.4 ***Impulsive process***

Contextual cues

All except of one healthcare professional reported that they had access to the electronic pop-up reminders that appeared in the patients' electronic records when one of the three targets (i.e. blood pressure, cholesterol or glycemic control) was outside the recommended range:

'There's a little pop-up screen at the right-hand corner, and that says diabetes information prescription, so that's a memoire for you' (ID6)

The majority of the responses of healthcare professionals indicated that if installed appropriately the pop-up reminders promoted their use of the new tool:

> *'So that was the single most useful thing [pop-up reminder], and that's how I first became aware of them, and that's why I keep remembering about them' (ID10)*

Healthcare professionals also reported that the people with diabetes acted as a social prompt to provide the new tool:

> 'Some patients are actually asking for them. Can I have the paper we had last time and what can we do this time' (ID14)

Habit formation

The vast majority of the healthcare professionals interviewed reported that they used the new tool automatically, without having to think about it consciously:

> *'Because I've been using it for so long [12 months] it has become a sort of subconscious way of using it rather than I have to remember to do it. You normally do it and it just happens' (ID6)*

Healthcare professionals reported that it took them between one to three months until they started using the new tool on a routine basis:

> *'I think it's the old adage that you use something for a month it gets into a habit. It's become a habit now' (ID14)*

> *'It probably took about a couple of months to get into the actual habit of it but now it's a routine thing that during the consultation it's printed off' (ID4)*

2.4.5 ***Multiple goal process***

Goal priority

Healthcare professionals reported a range of goals that took priority over the use of the information prescriptions. Treating comorbidities that occurred alongside diabetic symptoms were perceived as having higher priority:

'We have a lot of patients who have comorbidity so they're not just diabetic but they also have heart disease and rheumatoid arthritis or whatever, so all of those things need sorting out so you might decide that actually there's too much to do in one go.' (ID2)

Healthcare professionals also reported prioritising their goals according to the needs of their patients:

'I would go first of all according with the patient's reason for coming along and then I will say just looking at your notes before you came in I can see that we could be doing a little bit more for you and that's how I'd introduce it.' (ID4)

Lastly, healthcare professionals reported other administrative tasks often taking priority over the use of the information prescriptions:

'If you've got about 4 different forms to fill like dementia and unplanned admissions and you've got a bit of QOF [Quality Outcome Framework] to do then this would take a little bit of lesser priority' (ID6)

Goal conflict and facilitation

A minority of healthcare professionals reported that they had been using alternative self-management resources and strategies. For some of these healthcare professionals the new tool had substituted previously used self-management resources and strategies, whereas others kept on using competing methods which conflicted with their use of the information prescriptions:

'We did have our own care plans, […]. And that was all on one piece of paper, and then we had a little action plan that we wrote out for them. So when these ones [information prescriptions] came in I had probably not used them as extensively as maybe other surgeries would because we had already got our own care plan that we were using.' (ID9)

Healthcare professionals reported a range of different factors that facilitated their use of the new tool. Support by a dedicated administrative person, who

takes responsibility for making the new tool available, was perceived as facilitator:

> *'I think it's the fact we have a fantastic lady in our practice who looks at QOF and makes sure that we're getting the right things, so she came to me and she said oh, I've had information about this.' (ID14)*

Lastly, healthcare professionals reported that being involved in the development and piloting of the new tool (co-design) prompted them to use the tool more readily:

> '*I think being part of the developmental process has probably helped because it helps you to understand' (ID4)*

Table 1 Illustrative quotations by themes

	Illustrative quotation
Category: Reflective process	
1. Theme: Behaviour	"I probably used it on maybe about 20 or 30 percent because of the fact that we'd still been using our other tool." (ID9) "Not everyone because some of them are actually nicely controlled so once they're controlled they don't really need it so I would say probably about 15 percent. 15 to 20 percent at the very most." (ID4) "They all get one, for Type 2, they all get it [information prescription]." (ID5)
2. Theme: Outcome expectancies	
2.1. Sub-theme: Improve interaction	"I think it enhances it. I always try and build good rapport anyway, because the diabetes management and for behavioural change you need that. So this is an extra string to my bow." (ID12) "I know the patients very well and the families very well so I suppose it helps us to focus, otherwise it's very easy to go off on a tangent on something else." (ID14)
2.2. Sub-theme: Improve patient outcome	"Well it's all about empowering our patients isn't it? So giving them the information, giving them the knowledge." (ID10) "I believe that a patient who is knowledgeable about their own conditions are better at dealing with their condition" (ID2)
3. Theme: Intention	
3.1. Sub-theme: Most motivated	"I suppose I'm a self-selecting population. I'm a diabetes specialist, that's one of my interests, my passion, so I will be more motivated than the average clinician to use it." (ID10)

	"I've been part of the process so I'm quite highly motivated" (ID4)
3.2. Sub-theme: Least motivated	"If the patient says no, I want to talk about my knee pain only then it's heavy-handed to say no, I'm going to talk about this as well." (ID2) "I think if I've very busy and when you're short on time then I probably won't use it on that occasion but then it will pop up the next time so it gives me a thing to do there." (ID4)
4. Theme: Action planning	"When I'm just drilling in or homing in on one particular thing then I will use them." (ID9) "Now clinically I would always target the blood pressure first, and then I'd target the cholesterol, and then I'd target the HbA1c." (ID7)
5. Theme: Self-efficacy	
5.1. Barriers that reduce self-efficacy	"If they're not to hand or I don't have a printer or something that's when I'm less likely to do it because I'd have to go and look for it, so I'm less likely to use it then." (ID13) "It would be the fact that they may, actually, also have mental health issues and that needs sorting out." (ID2)
5.2. Facilitators that enhance self-efficacy	"So they need to be printed out and stapled and given out already, so that's in an ideal situation it would already be done for me." (ID12) "[…] because they are there on the computer. They're set up, it's one click of the mouse and it's there for you." (ID14)
6. Theme: Coping planning	"I have had patients who've said I don't want to talk about it right now, I'm in a rush. Fair enough. You park that and say let's do that another day or come and see the nurse another day and do that with her." (ID2) "I have an interpreter that works with me in my community clinic, and some family members come but I've always got an interpreter." (ID11)
Category: Impulsive process	

7. Theme: Automaticity	
7.1. Sub-theme: Contextual cues	"That pop-up box is a really good reminder that if I wanted to I could offer them a care plan." (ID9) "But the way we work through it is you can see at the bottom, there's a little pop-up screen at the right-hand corner, and that says diabetes information prescription, so that's a memoire for you." (ID6)
7.2. Sub-theme: Habit formation	"Once I was aware of them I got into the habit." (ID10) "Like anything new it wasn't easy getting other team members to do it but now they're used to it they're fine." (ID3)
Category: Multiple behaviour process	
8. Theme: Goal priority	"The amount you get prompted and plus as a GP I have lots of conflicting priorities and it depends on the time of the year so at the moment we have to hit targets for the QOF which ends in the end of March, so those will take priority." (ID2) "[…] the challenge is how do you fit in one extra intervention like this when you've got many of the pressure on your time." (ID6)
9. Theme: Goal conflict	"[…] the patient has of unplanned admissions and they're quite lengthy and quite chunky, quite meaty bits of work that you need to do and you've got your usual QOF which keeps reminding you x, y, z isn't addressed. (ID6)
10. Theme: Goal facilitation	"[…] you just say are we going to talk about these things, what do you think, and they might say yes, great idea, but I also want to talk about 5 other things then you might say well, actually, hang on, we'll just talk about 1 of those things and 1 of these things [information prescriptions], how about that.

2.5 Discussion

This qualitative interview study applied a dual process model of healthcare professional behaviour supplemented by a multiple goals approach to better understand the determinants involved in the implementation of a new self-management tool, the Diabetes UK information prescription. Data suggests that the uptake of the new tool could be explained by a combination of reflective (e.g. intention) and impulsive, non-conscious processes (e.g. cues, habit). Furthermore, we found evidence that both facilitating and conflicting goal-directed behaviours contributed to the extent to which healthcare professionals reported making use of the new tool.

Although, previous studies have applied dual process (Presseau *et al.*, 2014) and multiple goal models (Presseau *et al.*, 2009; Presseau *et al.*, 2013) to investigate clinical behaviours, the current study is unique in that it provides novel insights into how healthcare professionals form a habit to use a new self-management tool (i.e. information prescriptions). Given the consistent finding that the translation of evidence-based practices into routine care can be a slow process involving healthcare professional behaviour change (Grimshaw et al., 2012), these findings have the potential to inform the further implementation of the information prescription and/or other interventions.

The majority of healthcare professionals in the current study reported high intentions and positive outcome expectancies regarding the use of the new tool with their patients. The finding that reflective processes, as represented in most social cognitive models of behaviour, are an important predictor of healthcare professionals' behaviours is consistent with findings in the implementation literature (Grimshaw *et al.*, 2007). For example, a literature review including 31 studies found that intention was an important determinant of healthcare professionals' use of health information systems (Sezgin and Yıldırım, 2014). Although one factor that may have biased views towards a positive evaluation of the tool could have been that some of the participating healthcare professionals were directly involved in the development of the tool. This is in line with research suggesting that the active involvement of users in the implementation of new medical devices can promote a sense of ownership towards the device (Paré *et al.*, 2006).

The majority of healthcare professionals interviewed reported that after one to three months they had formed a habit, or an automatic way of using the new tool. Although this is not the first study that has found evidence that habit is an important driver of healthcare professional behaviour (Bonetti *et al.*, 2009; Grimshaw *et al.*, 2011; Potthoff *et al.*, 2017), this is the first qualitative study to our knowledge that examined habit formation in the context of the implementation of a new self-management tool. Healthcare professionals reported that one of the most important facilitators of their use of the DUK IP was the integrated prompts in the electronic patient records. This finding is in line with the literature around point of care reminders in healthcare professionals (Shojania *et al.*, 2009; Arditi *et al.*, 2011). For example, a systematic review including 32 studies found that computer-generated reminders had a moderate effect on improvement in healthcare practices (Arditi *et al.*, 2011). Another systematic review of 28 studies found that computer reminders achieved a median improvement in process adherence of 4.2% (Shojania *et al.*, 2009). From a habit perspective. reminders might be particularly useful as they help to maintain a behaviour that has become habitual, and increase behavioural automaticity (Lally and Gardner, 2013). Taken together this evidence suggests that the use of electronic reminders may be beneficial strategy to facilitate the use of information technologies, like the information prescriptions.

Results showed that healthcare professionals perceived other goal directed behaviours as interfering with the use of the new tool. These results are in line with other qualitative studies in patients (Presseau *et al.*, 2014) and healthcare professionals (Presseau *et al.*, 2009), that report the interfering effects of other goal pursuits on the performance of a focal behaviour despite strong intention. For example, some healthcare professionals were already using alternative, competing practices (e.g. alternative strategies to provide self-management advice, including information leaflets) that would directly compete with the use of the new tool. Given the limited time and resources that healthcare professionals have available during consultations, it is important to understand the range of different goals that compete for the attention of practitioners.

2.5.1 *Implications for theory development*

Implementation science can be understood as a systematic endeavor to better understand and promote the translation of clinical research evidence into routine practice. The implementation process includes understanding the behaviours of frontline healthcare providers who are expected to use evidence to inform their own practice (Eccles *et al.*, 2005). Behavioural theories can be applied to help build a cumulative science to better understand the processes that drive healthcare professional behaviour. Most contemporary theories focus on explaining single behaviours that are assumed to be driven by a reflective decision-making process (Ajzen, 1991; Godin *et al.*, 2008). The current study adds to a growing body of literature, which acknowledges that healthcare professionals' behaviours are driven not only by a reflective process of active decision-making, but also by more impulsive processes that trigger behaviour automatically in response to contextual cues (Nilsen *et al.*, 2012; Presseau *et al.*, 2014; Potthoff *et al.*, 2017). Furthermore, the theoretical framework that was applied in the current study did not look at behaviour (i.e. information prescription use) in isolation, but also acknowledged that new behaviours need to be integrated into a network of existing behaviours that have facilitating and interfering effects on each other.

2.5.2 *Implications for implementation support*

The current study can provide some guidance on how to promote the implementation of new self-management tools such as the information prescription. One way of supporting behavioural repetition (and habit formation) could be through the effective use of electronic pop-up reminders that prompt healthcare professionals on when to initiate a new behaviour (Arditi *et al.*, 2011). However, some healthcare professionals reported problems relating to the installation of the new tool on their computer systems. This is in line with other research showing that *ease of use* is one of the most important determinants of healthcare professionals' engagement with new technologies (Gagnon *et al.*, 2012). Future implementation interventions may need to provide additional support for the installation and use of information technologies to promote regular use.

This study also showed that effective implementation of new behaviours might need to be combined with the de-implementation of competing practices. For example, a minority of the healthcare professionals reported using alternative ways of providing self-management advice which might conflict with using the DUK IP. This is a challenge as research has shown that changing healthcare professionals' behaviour is difficult particularly if it involves changing existing routines (Grol and Grimshaw, 2003). It has been suggested that to break a habit one needs to overrule the impulsive system by engaging the reflective system (Strack and Deutsch, 2004). This process can be cognitively challenging and involves inhibiting activated habit responses. Such demanding self-regulatory processes might be hard to initiate in the stressful, time constrained context of clinical practice (Hagger, 2015). An alternative approach could be to remove cues that trigger the old habit (e.g. non-evidenced information leaflets), making it possible for healthcare professionals to consciously consider other behavioural alternatives. If the removal of cues is not feasible, planning strategies could be used to connect old habit cues (e.g. patient asking for information) with more desired responses that are in line with the evidence on best practice.

2.5.3 ***Strengths and limitations***

This study used directed content analysis to test an explicit and a priori-defined theory in the context of the implementation of a new evidence-informed tool (i.e. information prescriptions) in diabetes care. This approach is a strength of this study, because it allowed us to supplement and add context to findings from quantitative studies (See Chapter 4; Potthoff *et al.*, 2017) with more in depth qualitative insights. Whilst more quantitative evidence is required to substantiate the qualitative findings, we have provided evidence on how healthcare professionals perceive the formation of new routines and how these routines are incorporated into a system of existing behaviours. The theory-guided method helped contribute to a cumulative science that aims to understand the factors (e.g. intention and habit) that drive healthcare professional behaviour. Although this study had a relatively small sample size, later interviews did not generate any new responses to the main research question, i.e., how a dual processes and multiple behaviour perspective could help understand the implementation of a new evidence-informed tool. A limitation of this study is that

it only included healthcare professionals who were already using the DUK IP. Therefore, the study could have benefited from also recruiting healthcare professionals who were not yet using the DUK IP. Such individuals could have provided additional insights into the barriers of using the DUK IPs, including their reasons for and against selecting them as a self-management tool for use with their patients. Furthermore, the finding that healthcare professionals reported habit formation to take approximately one to three months has to be interpreted with caution. The frequency with which different healthcare professionals consulted people with type 2 diabetes may have varied considerably. For example, diabetes specialist nurses may have utilised the DUK IPs more regularly than practice nurses or GPs. Future research should consider the time as well as the frequency of behavioural repetition when investigating habit formation. Another limitation of this study is the self-reported nature of the estimation of time until habit formation. Self-reported measures of habit formation assume that a person can make an accurate reflection about the degree of automaticity of a given behaviour. Future studies should explore experimental measures (e.g., reaction time measures) to assess habit formation in a more objective way.

2.5.4 ***Unanswered questions***

While the current study does not allow us to draw conclusion about whether healthcare professionals have formed a habit of providing evidence-based care, it nevertheless allows us to generate hypotheses with regards to habit formation in this population. Future investigations could use quantitative methods (e.g. Self-Reported Behavioural Automaticity Index (SRBAI); Gardner et al., 2012) to assess how long it takes healthcare professionals to form a new habit for using a new self-managementl tool. Given that new practices often substitute outdated and/or non-evidenced ways of providing care, it would also be important to measure the process of de-implementation (or breaking habit). Another question for quantitative investigation is to what extent electronic reminders support the formation of clinical habits. From a theoretical perspective a habit is a learned tendency to perform a behaviour automatically in response to a specific cue, however open questions remain with regards to what kind of cues are most effective in prompting healthcare professional behaviour and how different cues compete for the attention of healthcare

professionals. Dual process models (Strack and Deutsch, 2004) predict that there are certain boundary conditions (e.g. stress and tiredness) under which behaviour is more likely to be driven by impulsive processes (e.g. habit). Given that healthcare professionals often experience high levels of stress (Johnston *et al.*, 2016) it would be interesting to see how boundary conditions effect the implementation of new clinical behaviours and whether healthcare professionals are more prone to revert back to old habitual ways of behaving when under pressure.

2.6 Conclusion

Healthcare professionals perceived that both reflective (e.g. intention) and impulsive (e.g. habit) processes had an impact on their adoption of a new national ‘information prescription’ for diabetes. Furthermore, they reported that other goal-directed behaviours such as competing practices influenced their adoption of the information prescriptions. Taken together data suggests that constructs from dual process and multiple goals approaches are useful to understand how new medical interventions are implemented into routine practice.

Chapter 3. Web-based action and coping planning intervention to improve uptake of Diabetes UK information prescriptions: a 2 x 2 factorial randomised controlled trial

3.1 Abstract

Background: Interventions aimed at changing clinical behaviours to improve healthcare quality typically focus on a single behaviour and on change strategies targeting a reflective path to behaviour change (e.g., intention). An intervention for clinical behaviour change based on a dual process approach was developed. The aim of the study was to test whether an action and/or coping planning intervention could support healthcare professionals in implementing a new self-management advice tool into routine primary care—the Diabetes UK information prescription.

Methods: Approximately 1600 healthcare professionals were invited to participate via a routinely delivered e-newsletter. Participants were entered into a raffle for an iPad. Participating healthcare professionals were randomised in a 2 x 2 factorial design to receive a web-based intervention delivered using volitional help sheets: an action planning and/or coping planning intervention, or neither, designed to promote use of the Diabetes UK information prescription. At baseline and follow-up, healthcare professionals were also asked to complete questionnaires assessing action planning, coping planning, habit, and self-reported use of the DUK IP.

Results: The study failed to reach recruitment targets; only 2 healthcare professionals responded at baseline only. Both participants reported high levels of DUK IP use at baseline and one participant reported using alternative methods of providing self-management advice in addition to using the DUK IP. Both participants were allocated to the combined action/coping planning condition and completed the intervention.

Conclusions:

The recruitment strategy in the current study was not acceptable and therefore it was not possible not determine whether a web-based planning intervention is effective for supporting healthcare professionals with the uptake of the DUK IP.

More research is needed to fine the recruitment strategy and find a feasible and acceptable way of supporting healthcare professionals with using the DUK IP.

Trial registration:

ISRCTN Register: 15637399. http://www.isrctn.com/ISRCTN15637399.

3.2 Introduction

The prevalence of type 2 diabetes has risen in recent years and the condition can lead to complications such as nerve and kidney damage, hearing impairment and early mortality (HSCIC, 2016). Based on a national report in the UK there were more than 3.2 million people diagnosed with type 2 diabetes in 2016 (HSCIC, 2016). A large component of diabetes care consists of self-management. For example, a systematic review found that effective self-management support in people with type 2 diabetes has positive effects on various health outcomes including quality of life, glycemic control, and cardiovascular disease (Norris *et al.*, 2001).

National clinical practice guidelines and quality standards [The National Institute for Health and Care Excellence; NICE] call for more self-management interventions targeting people with diabetes (McGuire *et al.*, 2016). In 2011 a national study, i.e., the improving Quality in Diabetes (iQuaD; Eccles *et al.*, 2011), investigated six guideline recommended examining, prescribing and advising behaviours in primary care clinicians and found that clinicians provided self-management advice to only 68% of people with diabetes for who such advice would have been appropriate (Eccles *et al.*, 2011). A possible explanation for why healthcare professionals may not always provide self-management advice when appropriate could be that they lack an evidence-informed resource that allows them to effectively provide information and support to patients to engage them in health behaviour change (i.e. supportive self-management).

Diabetes UK in collaboration with Newcastle University developed a ‘Diabetes UK Information Prescription (DUK IP)’ for type 2 diabetes to address this gap (Potthoff *et al.*, 2016). The DUK IP is a tool that was developed to help healthcare professionals and people with diabetes with making shared-decisions about the treatment and self-management of three important diabetes-related health targets: blood pressure, cholesterol, and HbA1c (see Appendix A). The DUK IP was developed to provide a means facilitate interactions between clinician and patient to address patient risk perception and support goal setting, action planning and coping planning in people with type 2 diabetes (Greaves *et al.*, 2011; Avery *et al.*, 2012; Hankonen *et al.*, 2014).

Initially, Diabetes UK planned that the DUK IP would be rolled out nationwide, however no clear implementation strategy was in place. As such the opportunity arose to embed a trial within the implementation plan to evaluate whether a behavioural intervention could support healthcare professionals with embedding the DUK IP within their existing clinical routine, and to understand the mechanisms of this intervention.

The application of behaviour change interventions to support healthcare professionals with the adoption of new medical practices has become increasingly popular within the implementation literature (Grimshaw *et al.*, 2001; Michie *et al.*, 2005; Michie *et al.*, 2011; Presseau *et al.*, 2014; Presseau *et al.*, 2014). Furthermore, there has been a recognition that the use of evidence-based theories can inform the development and evaluation of effective interventions and that such an approach can contribute to a cumulative science (Eccles *et al.*, 2005; Davidoff *et al.*, 2015). To date, most behaviour change interventions that aimed to support healthcare professionals with behaviour change applied social cognition models (Perkins *et al.*, 2007), which assume that healthcare professional behaviour is the result of a reflective decision-making process (e.g., intention) (Godin *et al.*, 2008). A shortcoming of social cognition models is that they do not explicitly account for the role of implicit processes such as habit (Sladek *et al.*, 2006; Aarts, 2007; Nilsen *et al.*, 2012; Sheeran *et al.*, 2013; Presseau *et al.*, 2014).

Dual process models add an impulsive pathway, predicting behaviour alongside a parallel reflective pathway (Benner, 1982; Epstein, 1990; Hofmann *et al.*, 2008). The reflective pathway is in line with social cognition models that include conscious and effortful decision-making, whereas the impulsive pathway includes mechanisms such as habit (i.e., a learned tendency to perform a behaviour automatically in response to cues) (Gardner, 2014). An example of a clinical habit includes healthcare professionals providing a specific clinical service in response to a reminder in the patients' electronic record for instance. For habit to form, the behavioural repetition is needed in a stable context (Lally *et al.*, 2010). For example, the first time a healthcare professional is presented with a person with diabetes with elevated cholesterol levels he/she may carefully consider the different treatment options (i.e., advising to eat more healthily or prescribing a statin) before taking any clinical actions. Initially, the

decision on what treatment to choose may be based on a slow and deliberate decision-making process (e.g. weighing pros and cons) (Godin *et al.*, 2008). However, after being presented with numerous people with the same symptoms the decision to advise healthy eating or prescribe a statin may shift to a more automatic process (i.e. habit) that operates outside of the healthcare professionals' conscious awareness (Strack and Deutsch, 2004; Hofmann *et al.*, 2008). Once a habit has formed it may allow the healthcare professional to act quickly and appropriately in the busy clinical environment. Furthermore, since habit does not rely on limited cognitive capacities, the healthcare professional can allocate the saved time and resources to other more cognitively demanding tasks (Neal *et al.*, 2013). The challenge of once habit has set in, habitual behaviours is that they are difficult to change (Walker *et al.*, 2015). This can be a problem in the face of continuous developments in clinical practice (Grol and Grimshaw, 2003). Although, there are already interventions that may target the impulsive pathway to change healthcare professionals' clinical behaviours (e.g., using electronic reminders) these interventions often do not explicitly evaluate the underlying mechanisms of change (i.e., habit formation) (Shojania *et al.*, 2009).

Another line of research that adds value to social cognition models is concerned with the multiple goals that healthcare professionals pursue during their practice (e.g., maintaining rapport with the patient, prescribing, and examining) (Presseau *et al.*, 2009; Presseau *et al.*, 2010; Presseau *et al.*, 2011). Given that healthcare professionals often have limited time for each patient consultation there is a risk that goals are in conflict with each other and this may result in specific services not being provided (e.g., provision of self-management advice). Therefore, a greater consideration of these competing goals could support the effectiveness of interventions that aim to promote the uptake of new practices in healthcare professionals.

As well as behavioural repetition, there may be alternative ways through which habit formation can be facilitated. There is evidence to suggest that planning interventions such as action- and coping planning may be effective strategies to support healthcare professionals with habit change (i.e. creating and breaking habit) (Casper, 2008; Verbiest *et al.*, 2013; Verbiest *et al.*, 2014). Action plans are specific plans of when, where and how to enact a specific behaviour

(Gollwitzer, 1999; Sniehotta *et al.*, 2005; Hagger *et al.*, 2016; Potthoff *et al.*, 2017). For example, a healthcare professional may have a plan that states: "When a person with diabetes presents with elevated cholesterol levels, then I will prescribe a statin". Action plans support habit formation by creating mental links between specific situations/cues (e.g. person with elevated cholesterol levels) and goal directed behaviours (e.g. prescribing a statin). Once this link is formed, behaviour is likely to be prompted more automatically when the specified situation (e.g. patient with elevated cholesterol levels) occurs or the cue is encountered (Gollwitzer, 1999).

Contextual cues play an important role in planning and in habit formation (Webb and Sheeran, 2004; Orbell and Verplanken, 2010). There are different types of cues including social cues (e.g. patient asking for more information), contextual cues (e.g. electronic reminders) and time-related cues (e.g. consultation coming to an end). Most interventions targeting healthcare professional behaviour have focused on environmental cues, such as electronic reminders (Shojania *et al.*, 2009; Arditi *et al.*, 2011). A systematic review of twenty-eight studies with a randomised or quasi-randomised design found a small-to-modest effect size for electronic reminders on healthcare professional behaviour (e.g., medical ordering, vaccinations, and test ordering) (Shojania *et al.*, 2009).
Coping planning is another volitional strategy whereby a person specifies how to deal with anticipated barriers to an intended behaviour (Sniehotta *et al.*, 2005; Kwasnicka *et al.*, 2013). For example, a healthcare professional may have a coping plan stating: "When a patient's cholesterol levels cannot be lowered by a normal dose of statin, then I will increase the dose". In this scenario the patient's reaction to statins (e.g., no response in cholesterol levels to normal dose) is the barrier and the solution is to increase the dose.

While most of the evidence for the effectiveness of planning interventions has been demonstrated in patients and the public (Sniehotta *et al.*, 2005; Sniehotta *et al.*, 2006; Kwasnicka *et al.*, 2013), there is a small number of studies that have investigated the effectiveness of planning interventions to change healthcare professionals' clinical behaviours (Casper, 2008; Verbiest *et al.*, 2013; Verbiest *et al.*, 2014). One study found that healthcare professionals who formed a specific plan in addition to receiving clinical training were more likely to use the training in their daily practice, when compared to healthcare

professionals who received the training alone (70% and 58% respectively) (Casper, 2008). Likewise, GPs who reported having formed a highly specific action plan for providing smoking cessation care were more likely to provide this care at 6-month follow-up (Verbiest *et al.*, 2014). This effect was strongest in GPs who had reported high levels of intention to provide this care prior to the intervention. Furthermore, there is correlational evidence to show that healthcare professionals who reported higher levels of planning (action- and coping planning) at baseline are more likely to report enacting six prescribing, examining and advising behaviours with their patients with diabetes at 12-month follow-up (Presseau *et al.*, 2013; Presseau *et al.*, 2014; Potthoff *et al.*, 2017). Another study found that the positive relationship between planning and healthcare professional behaviour operated indirectly through habit (Potthoff *et al.*, 2017; See Chapter 4), providing first clues regarding the potential mechanism of change underlying conditional planning.

Planning interventions in combination with environmental cues therefore have potential to support healthcare professionals with adopting new evidence-based practices by facilitating the formation of new habits and/or by breaking old habits (e.g. substituting an old response to a cue with a more desirable response). Using planning to support healthcare professionals with behaviour change has many advantages. Planning interventions are embedded within established social psychological theories, they have low response burden, they are easy to deliver, low-cost and there is growing support for their effectiveness (Hagger and Luszczynska, 2014).

One mode of delivering a planning intervention is through the use of volitional help sheets (Armitage, 2008; Armitage and Arden, 2010). For example, healthcare professionals could be presented with a range of pre-formulated cues to action (e.g. patient asking for information) and/or barriers (e.g. too little time to deliver a service) and possible actions that could be taken in response to these cues (e.g. providing behaviour change advice) and/or barriers (e.g. defer to the next appointment).

Volitional help sheets can be delivered via paper and pen or digitally via web-based platforms. The use of web-based interventions may be advantageous as it reduces costs, is scalable and would allow healthcare professionals to

complete intervention modules at a convenient time and place. A systematic review assessed the effects of web-based continuing medical education interventions on healthcare professionals' performance and health care outcomes (Wutoh *et al.*, 2004). The review included 16 randomised controlled trials and showed that web-based interventions are just as effective in conveying knowledge to healthcare professionals as traditional formats (Wutoh *et al.*, 2004). A modelling experiment aimed to identify theory-based predictors of general practitioners' (GP) antibiotic-prescribing behaviour, compared a paper-based intervention with a web-based intervention (Treweek *et al.*, 2014). Both delivery modes (paper- and web-based) identified the same theory-based constructs to be predictive of GPs' prescribing behaviour (Treweek *et al.*, 2014). Thus far, to our knowledge there have been no intervention studies looking at the effectiveness of web-based planning interventions delivered via volitional help sheets to change healthcare professionals' habits.

The current study used a 2 x 2 full factorial design to investigate whether a web-based action and coping planning intervention, alongside electronic pop-up reminders are effective at promoting the uptake of the DUK IP. It was hypothesised that:

1. Healthcare professionals prompted to form an action plan of when, where and how to use the DUK IP would be more likely to use it six months later and less likely to use alternative ways of providing self-management advice.
2. Healthcare professionals prompted to form a coping plan on how to deal with barriers to the use of the DUK IP would be more likely to use it six months later and less likely to use alternative ways of providing self-management advice.
3. The interaction of receiving prompts to form action and coping plans would yield synergistic effects on the use of the DUK IP, such that the combined intervention would show the highest levels of use of the DUK IP at follow-up.

Additionally, this study included a theory-based process evaluation alongside the trial to provide greater clarity about the potential causal mechanisms through which any intervention effects on DUK IP use may be achieved

(Grimshaw *et al.*, 2007). We hypothesised that action and coping planning would assert their effects on the focal behaviour indirectly via the mediating variable habit. This hypothesis is based on the results of a previous correlational study which found that habit mediated the relationship between self-reported planning (action and coping planning) and six guideline recommended examining, prescribing and advising behaviours in healthcare professionals delivering care to people with diabetes (Potthoff *et al.*, 2017; See Chapter 4).

3.3 Methods

3.3.1 *Participants*

An invitation to participate in the study was sent out by Diabetes UK alongside a routinely sent (once every month) national e-newsletter (see Appendix F) prepared by Diabetes UK. Approximately 1600 healthcare professionals across the UK were signed up for the newsletter, but no formal methods to confirm the receipt were used. The invitation asked healthcare professionals to access a 15-minute web-based survey (via a hyperlink) asking questions regarding their views on the content and use of the DUK IP. The newsletter targeted a broad spectrum of healthcare professionals, including GPs, nurses, doctors and healthcare assistants from primary, secondary and community care. All healthcare professionals were required to have experience with using the DUK IP with people with diabetes to be eligible. Healthcare professionals who had no experience with using the DUK IP were excluded from the study. Participating healthcare professionals who provided data at all three measurement points (baseline, 3 and 6 month follow-up) were entered into a raffle for an Apple iPad Mini. Ethical approval for the study was obtained from the Newcastle University Faculty of Medical Sciences Research Ethics Committee (see Appendix B). Research assurance was provided by the North of England Commissioning Support Unit (see Appendix C).

3.3.2 *Procedures*

The invitation in the Diabetes UK e-newsletter contained a link to the web-based survey platform (see Appendix G), which could be accessed from any computer, pad or smart phone with an Internet connection. The start page of the survey provided some basic information regarding the DUK IP and the prize

draw for the Apple iPad Mini. Healthcare professionals automatically entered the raffle by entering their email address and by consenting to participate in the study. The first page of the survey was followed by background questions, the primary outcome measures and the process evaluation measures, and by one of the four intervention conditions (described below). Lastly, participants were thanked for their participation in the first questionnaire and informed that they would be contacted again (via email) to complete a follow-up questionnaire at 3- and 6-month follow-up. Figure 2 presents the flow through the web-based survey platform, including measures used for the theory-based process evaluation (mechanisms of change), and the allocation to one of the four intervention groups directly following completion of the questionnaire.

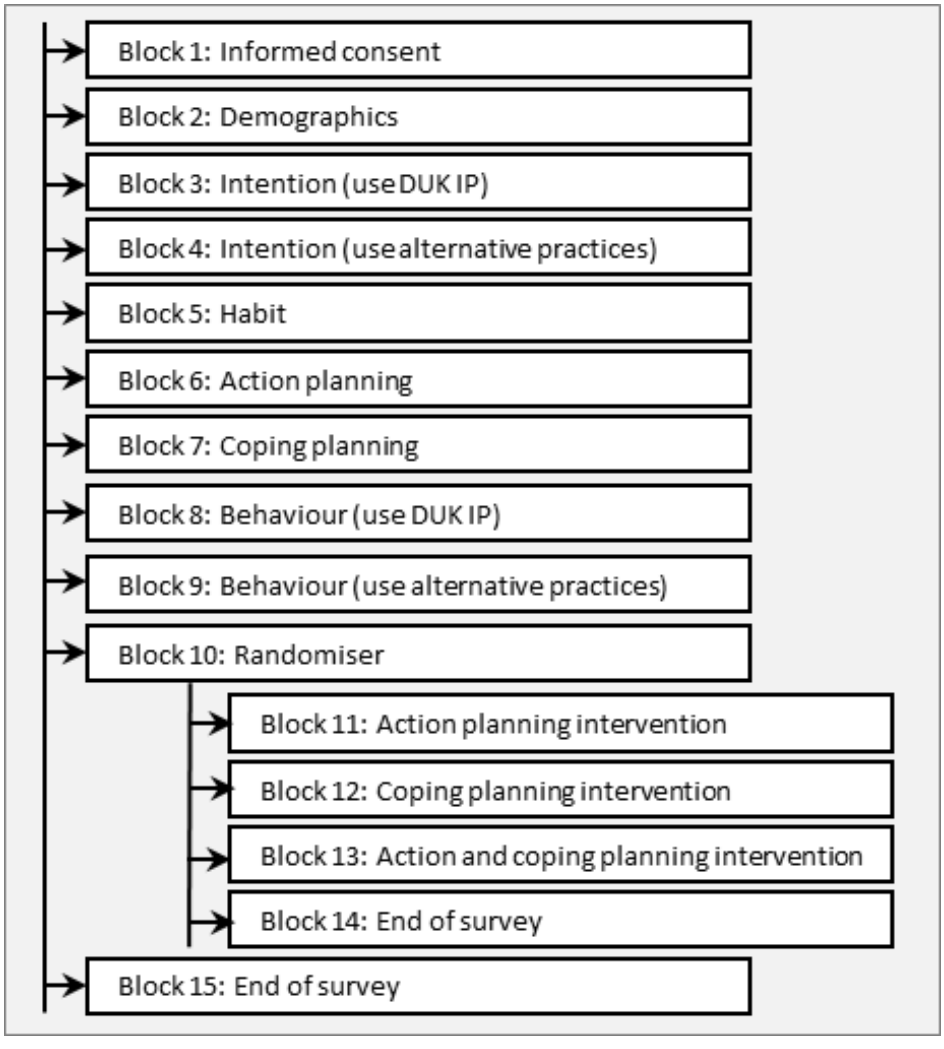


Figure 2 Flow diagram of the web-based survey platform

3.3.3 ***Sample size calculation***

There were no meta-analyses assessing the effect of planning interventions on healthcare professional behaviour, therefore we based our power calculation on a meta-analysis synthesizing the effects of implementation intentions ('if-then' planning) on physical activity behaviour in a general population sample (Bélanger-Gravel *et al.*, 2013). Given that this meta-analysis found a medium effect (0.31) for implementation intentions we assumed that a medium-sized effect would be meaningful within the context of this research. The estimated sample size necessary was N =128, using the parameters of f = 0.25, α = 0.05, and power (1 – β) = 0.80 in a four-group design with main effects and interactions. Expecting a response rate of between 25 and 75% (25% response at baseline, and 75% of those responding to baseline also responding to follow-up) from distributing the invitations to follow-up, we estimated that we would need to invite at least 910 clinicians to take part in this study.

3.3.4 ***Design***

A web-based platform (https://www.qualtrics.com/) was used to automatically randomly assign participants to one of four conditions following a 2 x 2 full factorial design with factors manipulating action planning and coping planning, delivered via volitional help sheets on the computer. Self-reported use of the DUK IP, relative to other alternative ways of providing self-management advice, was measured at baseline, 3- and 6 months following receipt of the intervention. Action planning, coping planning and habit were also assessed via a web-based questionnaire at baseline and at 3- and 6-months follow up.

3.3.5 ***Planning intervention***

Intervention development

A set of instructions for action planning and coping was adapted from a cluster-randomised controlled trial (i.e., the Improving Diabetes care through Examining, Advising, and prescribing (IDEA); Presseau *et al.*, 2014) which included action and coping planning to support healthcare professionals with providing guideline recommended care to patients with type 2 diabetes.
Given the finding that the specificity of plans formed by healthcare professionals plays an important role in the effectiveness of such interventions (Verbiest *et al.*,

2014) we decided to use volitional help sheets that included pre-specified opportunities/barriers and appropriate responses (Armitage and Arden, 2010; Verbiest *et al.*, 2014). The content of the planning intervention was informed by a previous qualitative study, which was purposefully designed to inform this study (Potthoff *et al.*, 2016; See Chapter 2). This study used an elicitation method to prompt healthcare professionals to report opportunities during which they regularly used the DUK IP and barriers which prevented them from using the intervention. The healthcare professionals were part of a subset of practices where the DUK IP were piloted. Opportunities reported during the interviews included when patients do not meet NICE recommended targets for diabetes (e.g., blood pressure outside the recommended range), during annual diabetes reviews, and when patients ask for information related to health behaviour change. The identified opportunities directly informed the 'If' component of the volitional help sheet for the *action planning* intervention. Similarly, healthcare professionals reported a range of barriers to their use of the IPs. Barriers reported during the interviews included situational barriers (e.g., full waiting room), patient-related barriers (e.g., first language is not English) and barriers related to the individual healthcare professional (e.g., lack of rapport with patient). These barriers directly informed the 'If' component of the volitional help sheet for the *coping planning* intervention. The resulting intervention was piloted internally at the Institute of Health and Society with five researchers using a 'think-aloud' method (French *et al.*, 2007). This is a method whereby participants are asked to provide spoken commentary of their thoughts during intervention completion, which provide insights into the reasoning, interpretation and understanding of the intervention (French *et al.*, 2007). One of the findings of the think-aloud study was that participants would have liked a more detailed description of the 'Then' component of the action and coping planning intervention. The initial version of the intervention specified which DUK IP (i.e., for high cholesterol, blood pressure, or blood sugar) healthcare professionals would use. In response to the feedback of the think-aloud study, a more detailed description was provided in relation to the 'Then' component. As a result, the intervention was adapted to include 'Ways of using the DUK IP' for the action planning intervention and 'My solution' for the coping planning intervention. For example, in the initial version a possible action plan was: "If my patient is in for their annual review, then I will use a high blood pressure

information prescription". In the adapted version of the intervention the same action plan included more detailed descriptions in the 'Then' component (i.e., "If my patient is in for their annual review, then I will use the information prescription to help my patient set personal behavioural goals that work for them"). In the adapted version of the intervention healthcare professionals had to match both 'Ways of using the DUK IP" and 'My solution' (i.e. the 'Then' components) with the corresponding 'If' component. Lastly, the intervention was cross-checked by an oncologist of the language used. The adaptation after cross-checking resulted in the final intervention.

Action planning

The action planning intervention was delivered using a web-based volitional help sheet including pre-specified opportunities to use the DUK IP (see Table 2). The opportunities covered a range of different scenarios and for each there were suggested opportunities based on likely scenarios encountered. Opportunities and ways of using the DUK IP were presented in a table in a non-matching order. Healthcare professionals were asked to link up three opportunities with a suitable response by dragging and dropping them together into an empty box.

Table 2 Action planning volitional help sheet with pre-specified ways of using the DUK IP

Opportunities to use the info prescriptions	**Ways of using the info prescriptions**
IF my patient's *blood pressure* is *elevated*…	**THEN I WILL** use an info prescription to explain what high blood pressure means
IF my patient's *cholesterol* is *elevated*…	**THEN I WILL** use an info prescription *to explain what high cholesterol means*
IF my patient's *HbA1c* is *elevated*...	**THEN I WILL** use an info prescription to *explain what high HbA1c means*
IF my patient is in for their *annual review*	**THEN I WILL** use an info prescription to *help my patient set personal behavioural goals that work for them*
IF my patient asks me *how to keep a healthy diet*	**THEN I WILL** use an info prescription to explain *how to eat more healthily*
IF my patient asks me *how to become more physically active*	**THEN I WILL** use an info prescription to *provide examples of physical activity*

Coping planning

The coping planning intervention was also delivered using an electronic volitional help sheet including potential barriers to the use of the DUK IP and possible solutions (see Table 3). The volitional help sheet covered a range of barriers (i.e. time-related, patient-related and clinician-related) that were identified in a previous study using elicitation interviews with healthcare professionals who had piloted the DUK IP (Potthoff *et al.*, 2016). Barriers and suitable solutions were presented in a table in a non-matching order. Healthcare professionals were asked to link the barriers with the appropriate solution by dragging and dropping them together in to an empty box.

Table 3 Coping planning volitional help sheet including pre-specified barriers and solutions to the use of the DUK IP

Potential barrier to my using Diabetes UK info prescriptions	**My solutions**
IF I have limited time…	**THEN I WILL** ask a colleague to complete a info prescription with the patient
IF the clinic is busy and I am *running 20 minutes* late…	**THEN I WILL** give the patient a copy of the prescription to take home and read in their own time
IF my patient's *first language is not English…*	**THEN I WILL** ask a friend or family member to translate the info prescription for the patient
IF I *have given lifestyle advice to this patient in the past*	**THEN I WILL** use an info prescription to provide self-management advise that is tailored to my patient's needs
IF I *do not have a good relationship* yet with the patient	**THEN I WILL** use the info prescription as a vehicle for building a relationship with my patient
IF I have a full waiting room…	**THEN I WILL** make sure that printed copies of the info prescriptions are available in the waiting room

3.3.6 ***Measures***

At baseline, healthcare professionals who started completing the questionnaire were given the following description: "The following questions focus on how YOU use the Diabetes UK information prescriptions in the clinical management over the next 3 months of your patients with type 2 diabetes *who are above target.*" Together with the measures this short description provided healthcare professionals with the *target, action, context* and *time* of the focal behaviour (i.e., use of the DUK IP) (Francis *et al.*, 2016; Francis and Presseau, in press).

Primary trial outcome

Use of the DUK IP was measured at baseline, 3- and 6-month follow-up by asking participating healthcare professionals to consider the past three months when answering the following question: "With how many of your last 10 patients with type 2 diabetes did you make use of the information prescriptions?".

Secondary trial outcome

Use of alternative ways of providing self-management advice was measured at baseline, 3- and 6-month follow up by asking participants to think of the past three months when answering the following question: “For how many of your last 10 patients with type 2 diabetes did you use other means of providing self-management advice?.

Measures used for the theory-based process evaluation

All secondary measures used a seven-point Likert scale ranging from 1 - strongly disagree to 7 - strongly agree. Higher scores represented cognitions in agreement with the behaviour. The development of the scales was informed by the PRIME and iQuaD study, two theory-based studies that aimed to identify modifiable predictors of healthcare professional behaviours (Walker *et al.*, 2003).

Intention to use the DUK IP was measured with a single item stating: “I intend to use the info prescriptions with my patients with type 2 diabetes who are above target within the next 3 months”.

Intention to use other means of providing self-management advice was measured with one item stating: “I intend to use other means of providing self-management advice to my patients with type 2 diabetes within the next 3 months”.

Action planning was measured using a previously validated three-item scale, modified to include information prescription use as the focal behaviour (Sniehotta *et al.*, 2005). An example of an action planning item utilised was: “I have a clear plan of how to bring up the information prescriptions during the consultation”.

Coping planning was also measured using a previously validated four-item scale, modified to include information prescription use as the focal behaviour (Sniehotta *et al.*, 2005). An example of a coping planning item utilised was: “I have made a clear plan regarding using the info prescriptions, even if I have limited time”.

Habit was measured with the four-item Self-Reported Behavioural Automaticity Index (SRBAI; Gardner *et al.*, 2012) which is a subscale of the Self-Reported Habit Index (Verplanken and Orbell, 2003). An example of a habit item utilised was: “Using the information prescriptions with my type 2 diabetes patients who are above target is something I do automatically”.

3.3.7 ***Planned analyses***

The data were analysed using SPSS 22. The aims was to analyse hypothesised intervention effects using an intention-to-treat analyses of covariance (ANCOVAs) with all randomised participants included in the analyses. Missing data at follow-up was imputed using an expectation maximisation method (Schafer, 1997). A 2 x 2 full factorial ANVOCA was used to test the main and interaction effects of the four intervention combinations on information prescription use at 6-month follow-up. Age, gender, and baseline information prescription use were entered as covariates. Effect sizes were calculated using eta squared (small = 0.01; medium = 0.06; large = 0.14). We planned to test mediation effects using the PROCESS macro in SPSS (Hayes, 2012). We planned to use a nonparametric bootstrapping procedure (5,000 resamples) was used for all coefficient estimations (ANCOVAs and mediation analyses) (Preacher and Hayes, 2004). This procedure has the advantage that it does not assume the assumption of normality of the sampling distribution.

3.4 Results

3.4.1 ***Participants***

Of the approximately 1,600 healthcare professionals invited to participate, 80 (5%) individuals clicked on the URL link that opened the web-based intervention. Of those that clicked on the link, two began the intervention by consenting to participate in the study. Figure 3 shows the flow of participants through the study. Participant demographics are summarised in Table 4. Both participants were female nurses working in primary care. They spent an average of 6.8 minutes completing the questionnaire and intervention. Their average time since qualification was 24 years. Both participants reported having used all three versions of the DUK IP (blood pressure, cholesterol, and HbA1c). A random sample of healthcare professionals who subscribed to the DUK newsletter was recruited between March and April 2015. Due to the low

response rate within the first month of recruitment it was decided to stop the trial. This decision was made together with the research team and the gatekeeper at Diabetes UK.

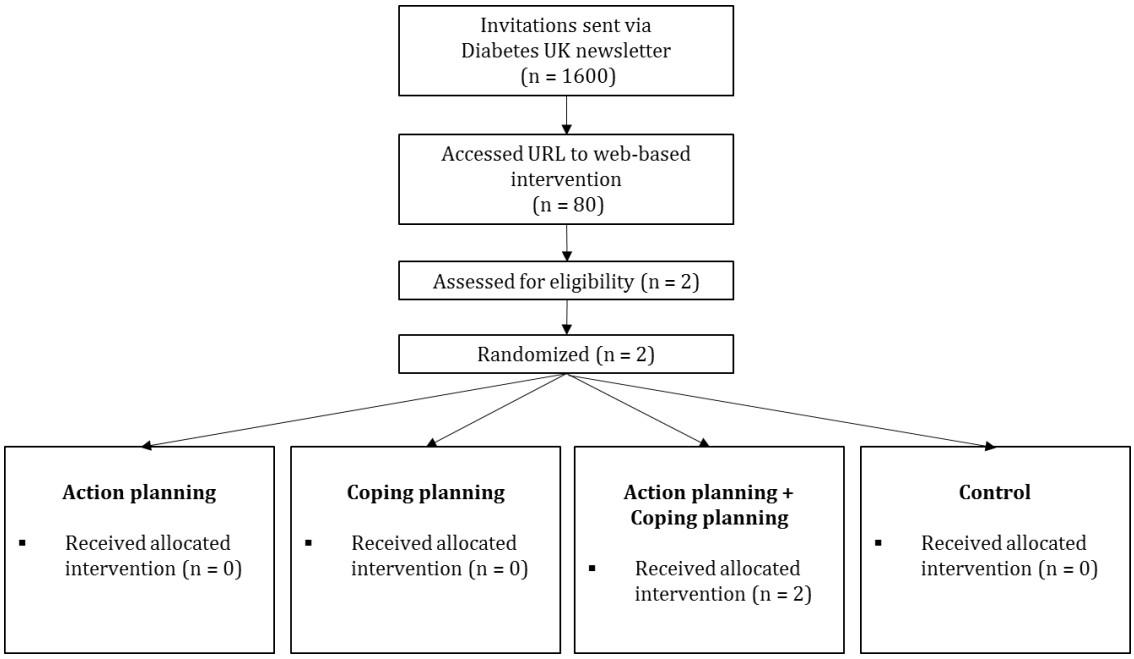


Figure 3 CONSORT flow chart showing the flow of participants through the study

3.4.2 ***Outcomes***

Due to the low response rate the original analysis plan could not be implemented. The following revised analysis presents basic descriptive statistics for the two collected responses. Both primary outcome measures and theory-based process evaluation measures are summarised in Table 4. Participants reported having used the DUK IP with ID1=7 people, ID2=9 people (out of 10) within the past three months. One participant (ID=2) reported having used alternative ways of providing self-management advice (in 5 out of 10 patients). Participants reported high intention to use the DUK IP (scores of 6-7) and medium to high intentions to use alternative ways of providing self-management advice (scores of 4 and 7). Participants reported medium levels of action- and coping planning (scores of 4 and 6) and their levels of behavioural automaticity also ranged between medium to high (scores of 4 and 7).

Table 4 Participant demographics and outcomes

Gender	Job title	Setting	Past behaviour (using DUK IP)	Past behaviour (using alternative practices)	Intention to use DUK IP	Intention to use alternative practices	Action Planning	Coping Planning	SRBAI
Female	Nurse	Primary care	7	6	6	4	4	4	4
Female	Nurse	Primary Care	9	5	7	7	6	6	7

Note. Alternative practices = alternative ways of providing self-management advice. SRBAI = Self-Reported Behavioural Automaticity Index. Past behaviour and intention scale ranged between 0-10 and all other scales between 1-7.

3.4.3 ***Planning intervention fidelity of receipt***

Both participants were randomly allocated to the combined action- and coping planning intervention. The action planning intervention was not completed as intended by both participants (see Figure 4 and 5). Instead of identifying an opportunity to use the DUK IP ('if-part') and dragging it into the same box as the corresponding way of using the DUK IP ('then-part'), participants dragged both parts into separate boxes. When interpreted in a chronological order, the 'if-parts' did not correspond with the 'then-parts' that were chosen by the participants. For example, participant 1 formed an action plan stating: "If my patient's HbA1c is elevated, then I will use the DUK IP to explain what high blood pressure means" (see Figure 4). The expected response in this instance would have been "…then I will use the information prescription to explain what high HbA1c means". The coping planning intervention was completed correctly by both participants; each box contained one barrier and one appropriate solution (see Figure 6 and 7). Participant 1 formed three coping plans dealing with barriers related to time, the patient and the healthcare professional (see Figure 6). Participant 2 formed one coping plan dealing with the patients' language (see Figure 7).

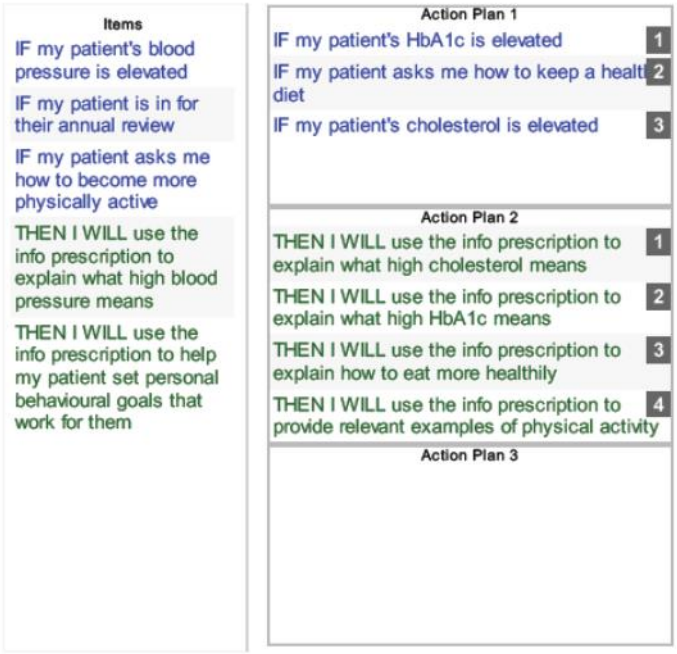


Figure 4 Action plans of participant 1 to provide the information prescriptions

Figure 5 Action plans of participant 2 to provide the information prescriptions

Figure 6 Coping plans of participant 1 to provide the information prescriptions

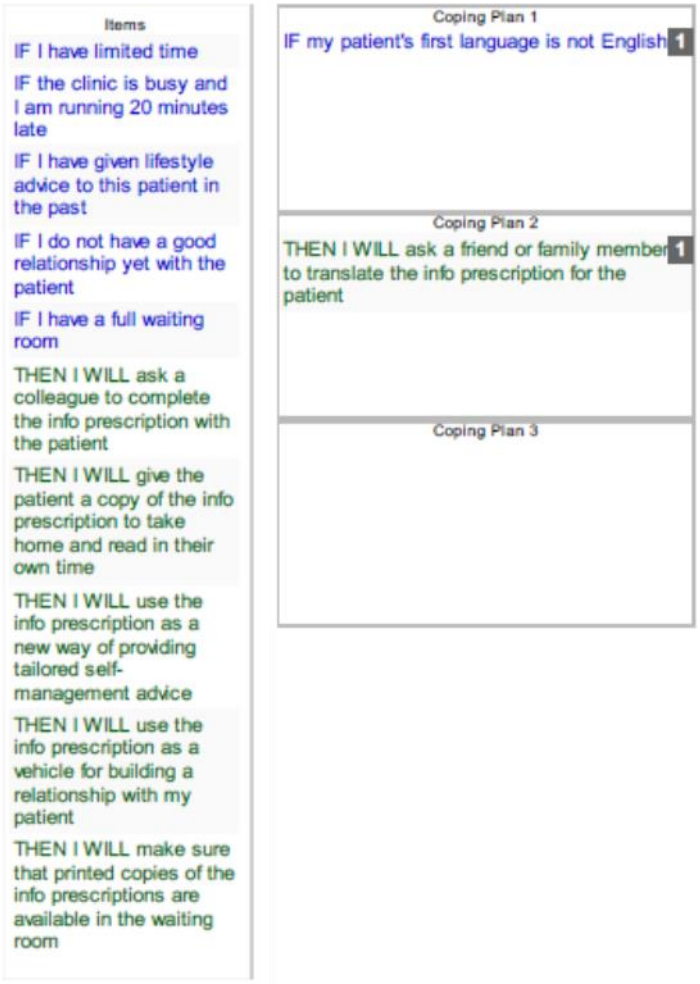


Figure 7 Coping plans of participant 2 to provide the information prescriptions

3.5 Discussion

This trial used a full factorial design that aimed to test whether conditional planning alongside electronic reminders would support healthcare professionals with forming a habit to use the DUK IP with people with type 2 diabetes. In addition, the trial aimed to test whether the implementation of the DUK IP would be accompanied by the de-implementation of alternative ways of providing self-management advice.

The trial failed completely to achieve the intended recruitment rates. Only two participants completed baseline primary outcome measures and measures for the theory-based process evaluation. Given the low sample size these results can only be interpreted with view to inform future studies. Baseline outcome measures showed that participants were already using the DUK IP at a high rate (in ID1=7 and ID2=9 out of 10 patients). The high baseline levels of DUK IP use could be due to the electronic pop-up reminders that facilitated the use of the DUK IP even before healthcare professionals completed the planning intervention. One participant had medium scores on the process measures (4 out of 7 on intention, action- and coping planning, and habit) indicating that there would be room to increase use of the DUK IP indirectly via these cognitive constructs. Furthermore, the second participant reported using alternative means of providing self-management advice, which may have conflicted with the use of the DUK IP.

To my knowledge this was the first study that used a web-based action- and coping planning intervention delivered via volitional help sheets to healthcare professionals. It remains to be established whether the intervention is effective in supporting healthcare professionals with clinical behaviour change, given a more refined recruitment strategy. The intervention platform remains available for an opportunity to implement an action and coping planning intervention in healthcare professionals in the future, which could benefit from alternative recruitment options (e.g. embedded within a workshop). Previous studies identified a web-based format of intervention delivery as feasible and effective as traditional paper-based methods (Treweek *et al.*, 2014). For example, a systematic review found web-based education interventions to be as effective as traditional intervention (Wutoh *et al.*, 2004).

This study has substantial limitations regarding the recruitment strategy. We aimed to recruit at least 128 healthcare professionals to have sufficient power for a four-condition factorial design with a main and an interaction effect. Based on recruitment rates in previous studies in healthcare professional populations we assumed that if we sent out the invitation to the estimated 1,600 healthcare professionals signed up to the Diabetes UK monthly newsletter we would be able to achieve our recruitment aim (Walker *et al.*, 2003; Eccles *et al.*, 2011). There are several potential reasons for the lack of participation in this trial. Firstly, healthcare professionals who received the invitation may not have had access to the DUK IP. Although, at the time of the trial DUK IPs were available via practice computer systems (e.g., EMIS or System One) not all practices were actively using them, therefore initial uptake and implementation was potentially an issue. Secondly, there may have been a lack of engagement with the invitation in the Diabetes UK newsletter. Unfortunately, it was not possible to determine what practices were signed up for the monthly DUK newsletter and therefore practices could not be emailed the invitation individually. The lack of recruitment in response to an email invitation is at odds with other studies in the literature which showed that using e-mail to invite GPs in an online trial did not have an adverse effect on recruitment and was easier and cheaper (Treweek *et al.*, 2012). However, in the mentioned study GPs were emailed directly and the email only contained a one-page letter and a two-page information sheet. The invitation in the current study was integrated amongst other information in a newsletter. Lastly, offering an entry into a raffle for an Apple iPad Mini may not have provided sufficient incentive for healthcare professionals who struggle to make time to participate in empirical studies. More successful studies have offered direct compensation, for example in form of gift vouchers, as an incentive to participate (Treweek *et al.*, 2012). There are several strategies that could be utilised to improve recruitment in trials involving healthcare professionals. A systematic review of randomised and quasi-randomised controlled trials examined ways to increase questionnaire responses in trials involving patients, clinicians, and members of the public. Promising strategies identified included: telephone reminders, open-trial designs, opt-out strategies and financial incentives (Treweek *et al.*, 2013). Furthermore, recruitment rates could be improved through closer collaboration with research networks and

embedding trials within existing infrastructures including continuing professional development events.

In addition to the limitations associated with the recruitment strategy there are some potential limitations with the development and delivery of the action and coping planning intervention. While the intervention was piloted internally with researchers and a clinician at the Institute of Health and Society at Newcastle University for ease of use, clarity, and functionality of the online delivery methods, this may not have been sufficient. According to the UK Medical Research Council guidance for the development and evaluation of complex interventions, it is essential to engage key stakeholders who are the target of the complex intervention (Craig *et al.*, 2008). A number of additional supplemental intervention development work could have been considered. For instance, interactive focus group discussions with GPs and practice nurses who are involved in delivering care to people with type 2 diabetes. Here they could have been presented with the implementation intervention to determine whether they would find such strategies useful for their own practice. Furthermore, healthcare professionals could have been asked about what else they would require to support them with the implementation of the DUK IP (e.g., training in the use of the DUK IP). This links to another limitation of the current implementation intervention, which is the use of a single implementation strategy (i.e., action/coping planning). There might have been multiple barriers at different levels (e.g., organisational level) that may have hindered the implementation of the DUK IP (Grol *et al.*, 2005). For example, there may be other competing tools that are already being used within the organisation to provide self-management advice. Such scenarios would call for a multifaceted implementation intervention targeting barriers to DUK IP use at multiple levels (e.g., removing old non-evidenced tools and training healthcare professionals in the use of the DUK IP) (Squires *et al.*, 2014). Due to the time limitations associated with completing the research presented within this thesis, the above were not addressed, but arguably should be in future research.

The current study applied a behavioural approach to improve the implementation of the DUK IP. The design of the implementation intervention was informed by a dual process model, acknowledging that healthcare professional behaviour is the result of both reflective and impulsive decision-

making (Presseau *et al.*, 2014). Based on this approach an intervention was designed to actively target the impulsive pathway to behaviour by creating a new habit (i.e., using the DUK IP), whilst breaking old habit (i.e., stop using alternative ways of providing self-management advice). Two simple behaviour change strategies (action- and coping planning) were selected that are embedded in established social psychological theory and that have been proven effective in both general population (Bélanger-Gravel *et al.*, 2013) and healthcare professional samples (Casper, 2008).

The implication of this trial is that more PPI, development and piloting is needed to ensure that the intervention and recruitment strategy is acceptable and feasible to be delivered to healthcare professionals. Integrating the intervention as part of a continuing professional development event or online course could help identifying healthcare professionals that could pilot the intervention and provide feedback.

3.6 Conclusion

The recruitment procedure in the current study was not acceptable and therefore it was not possible to determine whether a web-based planning intervention is effective for supporting healthcare professionals with the uptake of the DUK IP. More research is needed to find a feasible and acceptable way of supporting healthcare professionals with using the DUK IP during routine practice.

Chapter 4. A secondary analysis assessing the role of habit as a mediator of the planning-behaviour relationship in healthcare professionals

4.1 Abstract

Background: Gaps in the quality of care provided to people with type 2 diabetes are regularly identified. Healthcare professionals often have a strong intention to follow practice guidelines during consultations with people with type 2 diabetes; however, this intention does not always translate into action. Action planning (planning when, where, and how to act) and coping planning (planning how to overcome pre-identified barriers) have been hypothesised to help with the enactment of intentions by creating mental cue-response links that promote habit formation. This study aimed to investigate whether habit helps to better understand how action and coping planning relate to clinical behaviour in the context of type 2 diabetes care.

Methods: The study utilised a prospective correlational design with six nested sub-studies. General practitioners and practice nurses (n = 427 from 99 UK primary care practices) completed measures of action planning, coping planning, and habit at baseline and then self-reported their enactment of guideline-recommended advising, prescribing and examining behaviours 12 months later. Bootstrapped mediation analyses were used to test the indirect effect of action and coping planning on healthcare professionals' clinical behaviour via their relationship with habit.

Results: Healthcare professionals who reported higher degrees of action or coping planning for performing six guideline recommended behaviours in the context of type 2 diabetes care were more likely to report performing these behaviours in clinical practice. All twelve bootstrapped mediation analyses showed that the positive relationship between planning (action and coping planning) and healthcare professionals' clinical behaviour operated indirectly through habit.

Conclusion: These findings suggest that habit mediates the relationship between planning (action and coping planning) and healthcare professional behaviour. Promoting careful action and coping planning may support routinised

uptake of guideline-recommended care by healthcare professionals in the primary care setting. Given the competing demands on healthcare professionals, exploring the behavioural processes involved in promoting more routinization of behaviours where possible and appropriate could free up cognitive capacity for clinical behaviours that rely on more deliberation.

4.2 Introduction

Type 2 diabetes is a worldwide health issue affecting approximately 415 million people between the ages of 20 and 70 years in 2015 (Chen *et al.*, 2012; Holden *et al.*, 2013). In the UK alone, the number of diagnosed cases has doubled from 1.4 million in 1996 to 3.5 million in 2015 (Holden *et al.*, 2013). While poor management of type 2 diabetes can lead to serious complications such as cardiovascular disease (NICE, 2009; HSCIC, 2016), there is considerable evidence that successful management can decelerate, halt progression and in some cases even reverse the condition through health behaviour change (Lim *et al.*, 2011). Although there are national clinical practice guidelines for type 2 diabetes (e.g., UK (NICE, 2009), USA (Association, 2016), Canada (Wherrett *et al.*, 2013), and Australia (Deed *et al.*, 2014)) the implementation of these guidelines into clinical practice is frequently suboptimal (Grol, 2001). For example, a national diabetes audit in the UK showed that only 59% of patients received all eight guideline recommended care processes (e.g. blood test for glucose control and foot examination for foot ulcer risk) (HSCIC, 2016).

Well-tested theories from behavioural science can inform implementation interventions to modify healthcare professionals' behaviours, and explore mediating mechanisms and potential moderators of such interventions (Eccles *et al.*, 2009; Presseau *et al.*, 2014; Presseau *et al.*, 2014). Predominant theories of behaviour used in implementation science tend to propose that healthcare professional behaviour is determined by a reflective process of active decision-making (Godin *et al.*, 2008). Other approaches (i.e. dual process models) acknowledge that behaviour is driven by more than one system (Epstein, 1990; Strack and Deutsch, 2004; Sladek *et al.*, 2006; Wiers *et al.*, 2007; Reyna and Brainerd, 2011). According to these models, there are two systems of mental processing: a reflective system that is slow and effortful and is mainly engaged in conscious rational decision-making and an impulsive system that operates quickly and efficiently on a non-conscious level (Strack and Deutsch, 2004). This dual processing approach can be useful for informing implementation research, and interventions may be well-served to focus not only on changing the reflective pathway by educating and motivating healthcare professionals, but also on the role of impulsive processes (Nilsen *et al.*, 2012; Presseau *et al.*, 2014).

One variable that represents the impulsive pathway to behaviour is habit. Healthcare professionals often perform the same clinical behaviours repeatedly until they become routine practice and once a behaviour has become routine it is increasingly controlled by habit rather solely by conscious, in the moment decision-making. From a psychological perspective habit can be defined as “a process by which a stimulus automatically generates an impulse towards action, based on learned stimulus-response associations” (Wood and Neal, 2009). This definition is coherent with current theories and describes habit as an explanatory mechanism to behaviour (Sniehotta and Presseau, 2012; Gardner, 2014). The most traditional approach to habit formation involves repetition of a behaviour in a stable context (Lally *et al.*, 2010) to the extent that after sufficient repetition the behaviour can be triggered by the cues in the environment rather than by having to make a conscious decision each time (Wood and Neal, 2007). For example, a nurse might consciously decide to check a patients’ feet for sensation and circulation during an annual diabetes review. After several repetitions of this examining behaviour, the behaviour becomes an automatic response to a cue (e.g. a pop-up prompt in the patients’ electronic record during a diabetes review). Furthermore, in the recent literature a distinction has been made between habitual instigation (e.g., “choosing to provide weight management advice is something I do automatically”) and habitual execution (e.g. “once I have decided to provide weight management advice, giving weight management advice is something I do automatically”) (Phillips and Gardner, 2016). Although, there is a level of variability in the way in which healthcare professionals deliver care, there are some behaviours that are performed repeatedly in a stable context, which may be to some extent habitual (e.g. examining feet).

Recently, Nilsen and colleagues (Nilsen *et al.*, 2012) have called for research to explore strategies that could be used to help healthcare professionals with changing their habitual clinical behaviours (e.g. to replace old practices with new practices). Beyond the traditional repetition-based approaches to habit formation, two promising behaviour change techniques to create and break habit are action planning and coping planning (Nilsen *et al.*, 2012; Sheeran *et al.*, 2013). Experimental studies have shown that planning interventions can be used to facilitate habit formation by strengthening the association between

contextual cues and goal-directed behaviours (Adriaanse *et al.*, 2011). Action planning is a specific type of planning that has a scientific definition that differs from its lay usage. Action planning involves a person specifying very specifically when, where and how an intended behaviour will be performed. For example, 'During annual reviews, I will use an educational leaflet to provide personalised nutrition advice to all patients with an above target Body Mass Index (BMI)' (Gollwitzer, 1999; Sniehotta *et al.*, 2005). Coping planning, i.e. problem solving, is sometimes used alongside action planning (Kwasnicka *et al.*, 2013) and is another strategy that focuses on identifying potential barriers to an intended behaviour, and (importantly) specifying how to overcome those barriers (Sniehotta *et al.*, 2005). An example of a coping plan is: 'If the patient has difficulties reading the diabetes information leaflet, then I will ask a family member to read it out to the patient'. Research in clinical populations has shown that when used together, action and coping planning can be effective strategies for promoting various health behaviours including exercising and healthy eating (Sniehotta *et al.*, 2005; Kwasnicka *et al.*, 2013). In healthcare professionals, one study tested the hypothesis that the relationship between healthcare professionals' intention to provide guideline recommended care and self-reported clinical behaviour would operate indirectly through action and coping planning. The idea of a sequential reflective process underlying healthcare professional behaviour was confirmed for four of the six investigated behaviours (Presseau *et al.*, 2014). In addition, the same study tested whether after accounting for that sequential process, an automatic process might operate in parallel. The automatic process was shown to operate alongside the sequential reflective process in four of six clinical behaviours (Presseau *et al.*, 2014).

Although there is evidence to suggest that healthcare professionals who make plans are more likely to enact clinical behaviours (Casper, 2008; Presseau *et al.*, 2014), it is not clear through which mechanisms this change occurs. Action planning may function by making a specific cue more accessible in memory so that when the cue is encountered healthcare professionals are more likely to remember and perform the behaviour (Lally and Gardner, 2013). For example, if healthcare professionals form a plan to provide self-management advice to patients with diabetes with high blood glucose levels, they will be more likely to recall and enact the behaviour automatically in 'the heat of the moment'. When

an action plan has been formed the behaviour is more likely to be triggered automatically by the contextual cue (e.g. patient with high blood glucose levels) rather than by a slow, conscious contemplation process (Webb and Sheeran, 2007). Coping planning may function similarly by linking a barrier with a solution (i.e. the barrier would serve as a cue that automatically triggers the solution to the barrier rather than disengagement from the behaviour altogether).

The present study is a secondary analysis drawing on data from the large i.e. the national 'improving Quality in Diabetes' (iQuaD) study data set (Eccles *et al.*, 2011). The broader iQuaD study aimed to build a theoretical foundation to better understand the factors that underlie healthcare professional behaviour and to inform potential behaviour change interventions that target these factors (Eccles *et al.*, 2011; Presseau *et al.*, 2014). The first analysis of the iQuaD data set aimed to test whether constructs from contemporary theories of behaviour (i.e. social cognitive theory, theory of planned behaviour, learning theory, action and coping planning) could predict healthcare professional behaviour (Presseau *et al.*, 2014). The analysis found that theory-based constructs predicted multiple clinical behaviours in diabetes management. The second analysis further investigated whether the relationship between a reflective construct (i.e. intention) and healthcare professional behaviour operates indirectly through planning (action and coping planning) and whether habit operates in parallel alongside (Presseau *et al.*, 2014). The findings showed that healthcare professionals who had higher intentions to perform recommended clinical behaviours were more likely to report enacting these behaviours in practice and that this relationship operated indirectly through planning (action and coping planning). Furthermore, the same analysis showed that both reflective (i.e. intention) and impulsive processes (i.e. habit) are predictive of multiple clinical behaviours (Presseau *et al.*, 2014). While the analysis supported a dual process conceptualisation of healthcare professional behaviour, the authors did not hypothesise how features of the reflective process (e.g. action and coping planning) may themselves serve to promote features of the impulsive process (e.g. habit); rather, the analyses focused on how habit operates alongside the reflective processes. Consistent with the broader literature on how action and coping planning (and implementation intentions) serve to create cue-response links to promote habit formation, the present study involved conducting a

secondary analysis of iQuaD data to clarify the relationship between action/coping planning and habit in predicting healthcare professional behaviour. Although, previous analyses showed that planning (action and coping planning) is associated with healthcare professional behaviour (Presseau *et al.*, 2014), it remains unclear how this relationship operates. In the current study it was hypothesised that the relationship between planning and clinical behaviour operates indirectly through habit. This hypothesis was tested across six guideline-recommended advising, prescribing and examining behaviours in the context of type 2 diabetes management in the UK primary care setting.

4.3 Method

4.3.1 ***Design***

A prospective correlational design was used to determine whether healthcare professionals performed six guideline recommended clinical behaviours in the context of type 2 diabetes care. The study was a secondary analysis of the of the national 'improving Quality in Diabetes' (iQuaD) study dataset, which aimed to test theory-based determinants of healthcare professionals' behaviour involved in managing type 2 diabetes in the UK primary care setting (Eccles *et al.*, 2009). The six clinical behaviours selected for this study were: (1) Providing advice regarding weight management to patients with a BMI above 30 kg/m2; (2) prescribing additional antihypertensive drugs to patients whose blood pressure (BP) is 5 mmHg above 140 mmHg systolic or 80 mmHg diastolic BP; (3) examining foot sensation and circulation; (4) providing advice about self-management; (5) prescribing additional therapy for glycaemic control in patients whose glycaemic haemoglobin A1c (HbA1c) is higher than 8% despite maximum dosage on two oral hypoglycaemic drugs; and (6) providing general education about diabetes. Following receipt of informed written consent, participating healthcare professionals were asked to complete self-reported measures of each theoretical construct at baseline and self-reported measures of the six guideline recommended practice behaviours at 12 months follow-up.

4.3.2 ***Recruitment***

As described in the published study protocol (Eccles *et al.*, 2011), practices were recruited through the UK Medical Research Council General Practice

Research Framework (MRC GPRF). Initially, an invitation was sent to all GPRF practices in Scotland, Northern Ireland, Wales, and a random sample of practices in England, resulting in a total of 500 practices. One hundred practices were recruited and after excluding one practice due to low completion rates, the final number of practices was 99. A representative sample of 843 primary healthcare professionals (general practitioners and nurses) from the 99 general practices across the UK received a written invitation to complete a baseline questionnaire. Respondents were then invited to complete self-reported measures of examining, prescribing and advising behaviours 12 months later.

4.3.3 ***Survey administration***

The baseline questionnaire included measures of various theoretical constructs (Eccles *et al.*, 2011). To test the specific hypotheses in the present study, only measures of action planning, coping planning, and habit for each of the six clinical behaviours were analysed. All measures of the theoretical constructs (e.g. action planning) were tailored specifically to each of the six behaviours (e.g. action planning for the clinical behaviour weight management advice: 'I have a clear plan of how I will provide advice about weight management'). The questionnaire consisted of six sections each of which referred to a separate clinical behaviour. All relevant measures are summarised below and the full baseline and follow-up questionnaire can be found in Appendix H and Appendix I.

4.3.4 ***Measures***

A seven-point Likert scale ranging from 1-*strongly disagree* to 7-*strongly agree* was used to measure all theoretical constructs. Items forming each independent, mediating and dependent variable were developed and assessed separately for each of the six clinical behaviours. Higher scores represented cognitions in agreement with the behaviour. The development of the scale was directly based on the PRIME project, a theory-based study conducted with general medical and general dental practitioners (Walker *et al.*, 2003). The aim of PRIME was to apply well-established theories of behaviour to the experience of healthcare professionals, with the aim to identify modifiable variables that might be targets for intervention. This study examined the same theoretical

constructs and used similar response formats, however the item content was based on interviews and the behaviours were diabetes-focused.

Habit (mediating variable) was assessed with the four-item subscale of the Self-Reported Habit Index (SRHI; Verplanken and Orbell, 2003): the Self-Reported Behavioural Automaticity Index (SRBAI; Gardner *et al.*, 2012). An example item utilising the scale is, 'Providing advice about weight management to patients with a BMI above target is something I do automatically'. A higher score on the SRBAI indicates higher levels of habit/automaticity.

Action planning (independent variable) was measured using a previously validated three-item scale (Sniehotta *et al.*, 2005), modified to incorporate each of the clinical behaviours specified. An example of an action planning item utilised was, 'I have a clear plan of how I will provide advice about weight management'.

Coping planning (independent variable) was also measured with a previously validated 4 (i.e. for foot examination) to 12-item (i.e. for general education) scale (Sniehotta *et al.*, 2005). Items were informed by a list of potential barriers to performing the six clinical behaviours. An example of a coping planning item utilised is, 'I have made a clear plan regarding providing advice about weight management to patients whose BMI is above target, if the clinic is busy and I am running 20 minutes late'.

All six clinical behaviours (dependent variables) were assessed at 12 months follow-up with six self-reported items: e.g. examining foot sensation and circulation: "Over the past 12 months, for approximately how many of the last 10 patients did you examine the circulation and sensation of their feet?" (See additional file 4. in Eccles *et al.*, 2011 for all scale items).

4.3.5 ***Analysis***

It was hypothesised that planning would exert its' influence on healthcare professional behaviour through the psychological mechanism of habit. A mediation model was therefore used to test this hypothesis. In a mediation model, a variable X (planning) is assumed to be related to the outcome variable Y (healthcare professional behaviour), through the intervening variable called the mediator (habit) (Hayes, 2009). There are various methods that can be used

to test mediation models including the causal steps approach (Baron and Kenny, 1986) and the Sobel test (Sobel, 1982). An alternative to these approaches is the bootstrapping method (Hayes, 2013), which involves repeatedly sampling from the data and estimating the indirect effect in each resampled data array. Simulation studies comparing different methods of mediation analysis have demonstrated bootstrapping to be superior to methods such as the Sobel test (Sobel, 1982) or the causal steps approach (Baron and Kenny, 1986), because it provides higher power whilst minimising Type I error (MacKinnon *et al.*, 2002; MacKinnon *et al.*, 2004). Separate bootstrapped mediation analyses were run to test whether the relationship between action or coping planning and six clinical behaviours operated indirectly through their relationship with habit, resulting in 12 separate analyses (see Figure 8 and 9). First bivariate correlations between all variables within each clinical behaviour were examined. Then a bootstrap method was used to test the significance levels of indirect effects for the hypothesised mediation models using Preacher and Hayes (2008) INDIRECT macro. This is a computationally intensive procedure that involves repeatedly sampling from the data and estimating the indirect effect in each resampled data array. Simulation studies that assessed different methods of mediation analysis have found bootstrapping to be superior to methods such as the Sobel test (Sobel, 1982) or the causal steps approach (Baron and Kenny, 1986), because it provides higher power whilst minimising the incidence of Type I error (MacKinnon *et al.*, 2002; MacKinnon *et al.*, 2004). Therefore it was considered the most appropriate method to test the hypothesised mediation models. Since previous analyses of the same dataset found little evidence for clustering it was decided that it would not be necessary to account for clustering in the current analysis (Presseau *et al.*, 2014)

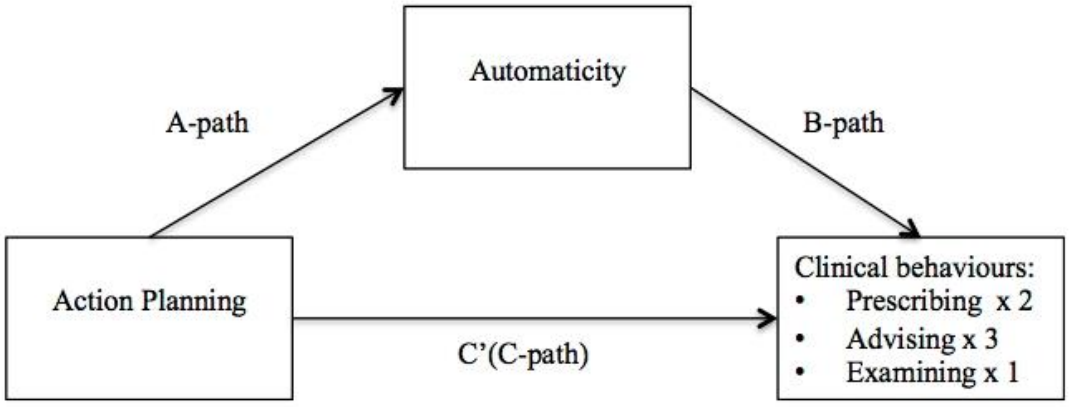


Figure 8 Indirect effect of action planning on clinical behaviours through automaticity. Path a is the direct effect of the predictor variable (action planning) on the mediator (automaticity). Path b is the direct effect of the mediator on the outcome variable

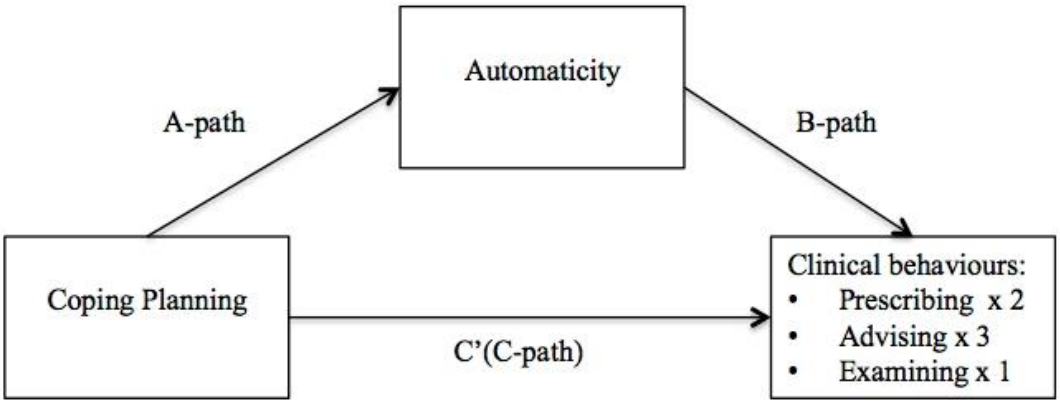


Figure 9 Indirect effect of coping planning on clinical behaviours through automaticity. Path a is the direct effect of the predictor variable (coping planning) on the mediator (automaticity). Path b is the direct effect of the mediator on the outcome variable

4.3.6 ***Contribution of this thesis to the iQuaD study***

This thesis reports the results of a secondary analysis of the iQuaD dataset (Eccles *et al.*, 2011). Although the author of this thesis was not involved in the design, recruitment or survey administration of the original iQUAD study, the unique contribution lies in the formulation and testing of the hypothesis that habit mediates the planning (action and coping planning) behaviour relationship in healthcare professionals. These hypotheses had not been tested in the original study or in any of its resulting publications. To test this hypothesis bootstrapping methods were utilised to conduct a secondary analysis of the iQuaD dataset.

4.4 Results

4.4.1 ***Response Rates***

The response rate for this study is reported at two levels, i.e. practice level and individual healthcare professional level (Eccles *et al.*, 2009). At the practice level, one hundred practices (out of 500) consented and were recruited; one

practice was subsequently excluded due to incomplete/unusable data. Thus, 99 practices consented and included healthcare professionals responding at baseline (19.8% practicelevel response rate). At the healthcare professional level, 843 healthcare professionals from the 99 practices were invited to participate and 489 returned completed baseline questionnaires (326 GPs, 163 nurses) (58% healthcare professional level baseline response rate in the 99 recruited practices). Follow-up questionnaires were returned by 427 (289 GPs, 138 nurses) healthcare professionals (87% follow-up response).

4.4.2 ***Descriptive statistics and correlations***

Descriptive statistics can be found in Table 5. 99% of practice nurses and 45% of GPs were women. On average GPs qualified in 1986 (SD = 8.50) and nurses in 1984 (SD = 8.25). Internal consistency measures for all measures are reported elsewhere (Eccles *et al.*, 2011). Cronbach's alpha for the construct measures ranged from 0.70 to 0.97. Although healthcare professionals reported performing each behaviour with the majority of their patients, there was considerable variability between healthcare professionals within and across behaviours. The scale mid-point of all the theoretical constructs was exceeded, showing a tendency of favouring the behaviour (Eccles *et al.*, 2011). Table 5 shows bivariate associations between all variables within all six behaviours. The size of the associations between the predictor variables (action and coping planning) and the mediator (habit) were medium (large for foot examination), and associations between the variables within each process were medium to large.

Table 5 Correlations between theoretical predictors and self-reported behaviour for both advising behaviours

Providing advice regarding weight management to BMI above a target of 30 kg/m^2 (N=424)				
	1	2	3	4
1. Behaviour	7.80 (2.48)			
2. Action planning	0.14**	5.88 (0.92)		
3. Coping planning	0.28**	0.31**	4.45 (1.26)	
4. Automaticity	0.37**	0.27**	0.49**	4.81 (1.29)

Prescribing to reduce blood pressure to 140/80 mm Hg (N=335)

	1	2	3	4
1. Behaviour	6.34 (2.64)			
2. Action planning	0.37**	5.91 (0.84)		
3. Coping planning	0.46**	0.48**	4.61 (1.22)	
4. Automaticity	0.51**	0.31**	0.49**	3.97 (1.33)

Examining the feet (N=218)

	1	2	3	4
1. Behaviour	6.96 (3.45)			
2. Action planning	0.37**	6.22 (0.99)		
3. Coping planning	0.46**	0.64**	5.53 (1.49)	
4. Automaticity	0.71**	0.41**	0.53**	4.36 (1.73)

Providing diabetes self-management advice (N=332)

	1	2	3	4
1. Behaviour	7.69 (2.58)			
2. Action planning	0.29**	5.44 (1.16)		
3. Coping planning	0.37**	0.61**	4.71 (1.36)	
4. Automaticity	0.37**	0.51**	0.58**	4.87 (1.51)

Prescribing to reduce HbA1c levels to <8.0 % (N=288)

	1	2	3	4
1. Behaviour	6.88 (2.71)			
2. Action planning	0.26**	5.62 (1.08)		
3. Coping planning	0.26**	0.67**	4.76 (1.31)	
4. Automaticity	0.29**	0.41**	0.51**	4.01 (1.46)

Providing diabetes-related education (N=346)

	1	2	3	4
1. Behaviour	7.76 (2.61)			

2. Action planning	0.43**	5.58 (1.17)		
3. Coping planning	0.34**	0.64**	4.49 (1.26)	
4. Automaticity	0.33*	0.55*	0.56**	4.91 (1.50)

Note. Table was adapted from (Presseau *et al.*, 2014). Permission from the authors has been obtained.

Means (SD) presented along the diagonal

*p<0.05, ***p<0.01, ***p<0.001.

4.4.3 ***Model testing***

It was hypothesised that there would be an indirect effect of action planning and coping planning on each of the six guideline recommended behaviours in type 2 diabetes care through habit (the mediator variable). In twelve separate analyses, the 95 % confidence intervals of the indirect effects were obtained with 5000 bootstrap resamples (Preacher and Hayes, 2008). All planning-behaviour relationships were shown to operate through habit. The estimates for the direct and indirect effects are shown in Table 6. In six out of the twelve analyses the relationships between planning and behaviour was no longer significant when the indirect effect via habit was accounted, indicating a full mediation effect.

Table 6 Bootstrap analysis of the magnitude and statistical significance of the direct and indirect effects

Independent variable	Mediator variable	Dependent variable	B unstandardized a-path	B unstandardized b-path	β standardized indirect effect	*SE*	95% CI (lower, upper)
AP	Automaticity	Weight management advice	0.37***	0.62***	.23	0.05	0.15, 0.34
CP	Automaticity	Weight management advice	0.49***	0.57***	.28	0.05	0.20, 0.38
AP	Automaticity	Prescribing additional an hypertensive drug	0.43***	0.47***	.21	0.06	0.10, 0.34
CP	Automaticity	Prescribing additional an hypertensive drug	0.54***	0.51***	.28	0.07	0.14, 0.43
AP	Automaticity	Examining feet	0.84***	1.04***	.88	0.15	0.61, 1.22
CP	Automaticity	Examining feet	0.68***	0.93***	.63	0.09	0.47, 0.83
AP	Automaticity	Advise about self-management	0.65***	0.45***	.29	0.07	0.16, 0.45

CP	Automaticity	Advise about self-management	0.62***	0.36***	0.23	0.06	0.11, 0.36
AP	Automaticity	Prescribe HbA1c	0.58***	0.34***	.20	0.06	0.09, 0.34
CP	Automaticity	Prescribe HbA1c	0.58***	0.33***	.19	0.06	0.14, 0.45
AP	Automaticity	Provide general education	0.67***	0.23**	.15	0.06	0.05, 0.27
CP	Automaticity	Provide general education	0.64***	0.32***	0.20	0.06	0.09, 0.32

Note. AP = Action Planning, CP = Coping Planning. As none of the 95% confidence intervals for the estimate of indirect effects included zero, there is a statistically significant indirect effect of action planning and coping planning on all six clinical behaviours through automaticity.

**p<0.01, ***p<0.001.

4.5 Discussion

The aim of the current study was to investigate whether the relationship between action planning and coping planning and six guideline recommended clinical behaviours in the context of type 2 diabetes care is mediated by habit. As hypothesised, healthcare professionals who scored higher on planning (action or coping plan) for providing advice, prescribing or examining feet were more likely to report performing such care (consistent with previous analyses) and this relationship operated indirectly through habit, which to our knowledge is the first time this has been demonstrated in healthcare professional populations and across multiple behaviours form the same population. This paper directly addresses calls from the literature for empirical tests of how habit relates to healthcare professional behaviour (Nilsen *et al.*, 2012). Specifically, this study shows that habit and planning are two important constructs to consider when targeting change in healthcare professional behaviour, and the mechanism by which planning may have its effect on behaviour is through habit.

These findings add to two previous analyses of the iQuaD data set (Eccles *et al.*, 2011; Presseau *et al.*, 2014; Presseau *et al.*, 2014). The first analysis showed that theory-based constructs can predict multiple clinical behaviours in the context of diabetes management (Presseau *et al.*, 2014). The second analysis showed that healthcare professionals who are more motivated to enact recommended clinical behaviours are more likely to report performing those behaviours and that the mechanism underlying this relationship is planning (action and coping planning). Furthermore, this second analysis supported the idea of a reflective-impulsive process, represented by habit and intention, which underlies healthcare professional behaviour. One question that resulted from these first two analyses was how, or through what mechanism, planning (coping and action planning) relates to clinical behaviour. The current analysis provides first evidence that the mechanism underlying the positive association between planning (action and coping planning) and clinical behaviour is habit. Given the correlational design of the study it is not possible to make any causal inferences about the direction of the relationship between planning and habit, however our findings provide useful theoretical insights with implications for healthcare professional behaviour change.

The positive relationship identified between action planning and clinical behaviour and this operating indirectly through habit is consistent with the literature on implementation intentions (i.e. specific 'if-then' plans) (Webb and Sheeran, 2007). It may be that healthcare professionals who form an action plan through a process of conscious deliberation create a mental link between a cue in the clinical context and a goal directed behaviour. Once the cue is encountered (e.g. during the consultation) the healthcare professional may be more likely to perform the planned behaviour as an automatic response to that cue. We also found that healthcare professionals who scored higher on coping planning were more likely to report executing guideline recommended clinical behaviours even when faced with barriers. Again the positive relationship between coping planning and clinical behaviour operated indirectly through the mechanism of habit. It is probable that the mechanism underlying coping planning is comparable to action planning in that a mental link is formed between a (risk) situation and an appropriate behavioural response (coping plan). Furthermore, coping planning might promote habit formation indirectly by supporting behavioural maintenance in the face of potential obstacles (Kwasnicka *et al.*, 2013). Both the linkage of a risk situation with an appropriate coping response and maintained behavioural performance could contribute to the process of habit formation in the clinical context.

There are several reasons why it may be useful to promote habit formation in healthcare professionals in the primary care setting. Healthcare professionals have limited time available during consultations and often have to make numerous skilled decisions. Once a behaviour has become habitual it can proceed quickly and efficiently in response to contextual cues (Bargh, 1994; Deutsch and Strack, 2006) rather than having to rely on slow, more cognitively demanding processes. For example, one guideline recommended practice in diabetes care involves prescribing medication to reduce blood pressure. The initiation of this behaviour is often preceded by an explicit cue (i.e. blood pressure target not met) and could therefore be elicited habitually. Once the behaviour has been initiated, more deliberative decision-making can be utilised to decide/agree on the specific medication regime. This example is in line with dual process models which suggest that behaviour is driven by both reflective and impulsive processes which operate in parallel (Deutsch and Strack, 2006).

Furthermore, habit is useful as a behavioural determinant to healthcare professional behaviour (Nilsen *et al.*, 2012). The dominant theories used to predict healthcare professional behaviours focus on concepts that are part of the reflective pathways to behaviour (e.g. attitudes, norms, intention and self-efficacy). By focusing on the reflective pathway only, there is a risk of neglecting important aspects of the variance of healthcare professional behaviour, a proportion of which can be explained by impulsive processes such as habit.

4.5.1 ***Strengths and limitations***

The mediation models were tested across six different guideline recommended behaviours in type 2 diabetes care. To test the mediation models state of the art bootstrapped mediation analysis was used, which is superior to traditional methods of mediation analysis and therefore is considered a strength of this research (Sobel, 1982; Baron and Kenny, 1986; MacKinnon *et al.*, 2002). Bootstrapping is based on an estimate of the indirect effect, however compared to the Sobel test, it makes no assumptions about the sampling distribution of the indirect effect, making it a more flexible approach (Hayes, 2009). For bootstrapping no standard error is needed to make the inference, bypassing the problem of how to optimally estimate the standard error of the indirect effect (Hayes, 2009). All theoretical measures had the same level of specificity using the TACT (Target, Action, Context, and Timing) principle, and corresponded with the clinical behaviours. Furthermore, although previous research has shown that planning plays a post-intentional role and can promote the enactment of recommended clinical behaviours (Casper, 2008; Presseau *et al.*, 2014) this is the first study to show that habit may be the mechanism underlying the relationship between planning and clinical behaviour. Given the consistency of this result across both planning cognitions and six guideline recommended behaviours, one would expect that these results could translate to other clinical behaviours across different healthcare sectors (e.g. secondary and tertiary care). A limitation of this study involved the cross-sectional assessment of planning and habit. Cole and Maxwell have called this a half-longitudinal design and emphasise that this might introduce a source of bias to the observed effect [48, 49]. Furthermore, the observational nature of the study and the fact that planning (action and coping planning) and habit were both measured at the same time does not allow for any causal inferences about the direction of the

relationships. Future research could explore this mediation model in a longitudinal design where all variables (independent, mediator, and dependent variable) are measured at different time points, or else alongside a randomised trial design which would allow for a more robust assessment of the causal mechanisms underlying planning. An example of how this mediation model can be tested alongside a trial can be found in Chapter 3. A further limitation of this research was that habit and healthcare professional behaviour were measured through self-report. Measuring habit through self-report assumes that individuals can be aware of the degree of habit strength of a given behaviour by reflecting on the consequences of their actions (Gardner *et al.*, 2012; Sniehotta and Presseau, 2012). Despite this limitation, the Self-Reported Behavioural Automaticity Scale has shown to be a reliable measure that is consistent with recent theoretical definitions of habit (Gardner, 2014). Future studies could explore qualitative research methods to observe habitual behaviours in the clinical context. Video observations and conversation analysis might offer a promising way to assess cues and automatic behaviours by studying interactions, paying attention to both verbal and non-verbal cues (Drew *et al.*, 2001). This is a data driven process through which habitual patterns of interaction can be identified, therefore it could be useful for observing and changing habitual behaviours in clinical practice through feedback provision. Measuring behaviour through self-report is another potential source of bias and it cannot be ruled out that healthcare professionals over-reported the extent to which they had delivered a specific aspect of care. This study focused on the behaviour of individual healthcare professionals, yet healthcare is often delivered by teams/groups. Therefore it would be beneficial to test the proposed model using different ways of aggregating the individual habit scores. For example, a multilevel modelling approach could be used to account for both individual and practice-level clustering of habit (Presseau *et al.*, 2014). The individual baseline response rate of 58% is higher than what was achieved in previous theory-based questionnaires surveys (Walker *et al.*, 2003), possibly due to the recruitment of practices that may be more motivated (which may have reduced the representativeness) and the use of remuneration for time spent completing the questionnaire.

4.5.2 *Implications for intervention design*

From a behavioural perspective the issue of implementation can be conceptualised as a need to create new clinical routines or habitual behaviours. Similarly de-implementation can be conceptualised as the need for 'breaking' old routines. The findings in this study offer some suggestions that might be useful for developing behaviour change interventions that are in line with practice guidelines and 'breaking' outdated routines. This research shows that action and coping planning may support clinical behaviour by creating cue-response links that underlie habit (Casper, 2008). There are various modes through which an action and coping planning intervention could be used to support healthcare professionals with changing their routines. Interventions could be delivered with the help of planning sheets that include pre-specified situations and solutions or could be self-formulated (Armitage, 2008). Although independent planning is easier and more cost effective, monitored and supervised planning (e.g. using telephone assistance) allow for controlling the quality of the plans, which is essential for effective behaviour change (Armitage, 2008). In cases where monitoring is not possible the use of planning help sheets could be another intervention option. These planning sheets could include pre-specified opportunities to enact recommended clinical behaviours and ways in which these behaviours could be performed in the clinical context. Similarly, a planning sheet could include barriers to good practice and possible ways of coping with these barriers. Furthermore, qualitative research methods (e.g. interviews or video observations) could be used to identify both contextual cues and/or barriers to good practice that could be used to inform a planning sheet, minimising the demands on healthcare professionals, whilst maximising the quality of potential plans. An example of how an action and coping planning intervention can be delivered using volitional help sheets can be found in Chapter 3.

4.6 Future research

Intervention developers who are devising an intervention to support healthcare professionals to change their behaviour may want to consider the nature of the target behaviour as a first step in their intervention development process. There is evidence to suggest that some behaviours may be more conducive to becoming habitual, whereas other behaviours may require additional support

(Ouellette and Wood, 1998). For example, one meta-analytic synthesis showed habitual behaviours could be distinguished from non-habitual behaviours based on two characteristics: frequency of opportunity to enact (daily or weekly versus a few times a year or less) and stability of context (stable versus less stable) (Ouellette and Wood, 1998). According to this study, behaviours that are performed infrequently and in a varying context may need additional behaviour change support to become habitual. In addition to behavioural frequency and stability of context there may be other behavioural characteristics that may be relevant in the context of habit formation. For example, one study used a bottom-up approach to develop a classification system of behaviours based on their underlying characteristics (McEachan *et al.*, 2010). The study identified 25 ways of describing health behaviours, which were further reduced to three key dimensions (e.g., 'easy immediate pay-offs' versus 'effortful long-term pay offs'). Based on this classification system behaviours that are more effortful and that only pay off in the long-term may require more sustained intervening to make them habitual. For example, providing nutrition advice to a patient with high cholesterol levels may be more effortful than prescribing a statin and the pay-off in terms of lowering cholesterol levels may be perceived to take longer than for statins. Therefore, a more sustained intervention approach may be necessary to support healthcare professionals with forming a habit of providing physical activity advice (e.g., using action and coping planning).

4.7 Conclusion

To the authors' knowledge this is the first study that has tested the role of habit as a mediator of the planning-behaviour relationship in a large sample of healthcare professionals. It was found that the relationship between planning and six guideline-recommended prescribing, examining, and advising behaviours operated indirectly through habit. Given the challenges of implementing guideline recommended care and de-implementing outdated care within time constrained practice environments, these findings have the potential to inform the development of novel interventions that target habit to promote improved healthcare.

Chapter 5. A systematic review and meta-analysis assessing the relationship between habit and healthcare professional behaviour

5.1 Abstract

Background: Healthcare professionals often provide care on a routine basis and much of their behaviour can be viewed as habitual. This systematic review aimed to critically appraise and synthesise research evidence investigating the association between habit and healthcare professional behaviour.

Methods: A systematic search of electronic databases (MEDLINE, PsycINFO, EMBASE, Scopus and CINAHL) was performed to identify studies reporting correlations between habit and healthcare professional behaviour. Meta-analysis was used to assess the overall habit-behaviour association across behaviours and across included studies. Two moderators were examined by means of sub-group analyses: type of behaviour measure (objective vs. self-report) and type of behaviour (i.e. advising, examining, prescribing, providing dental treatment and referring).

Results: Nine eligible studies involving 1,975 healthcare professionals were identified. The nine studies included 28 habit-behaviour correlations. A combined mean r+ of 0.35 was observed between habit and healthcare professional behaviour. None of the moderators had an effect on the strength of the habit-behaviour correlation.

Conclusion: Habit plays a significant role in healthcare professional behaviour. Intervention developers may need to support healthcare professionals in creating new habits to provide evidence-based health behaviour change interventions, while breaking old habits or de-implementing outdated non-evidence-based practices.

5.2 Introduction

New research evidence in the form of breakthrough medications, improved devices, and evidence-informed health behaviour change interventions are produced at a consistent pace. Delivery of these interventions often requires someone in the healthcare system to do something differently, i.e. to change their own clinical behaviour. While considerable resources are invested into the research and development of evidence-based interventions for use in clinical settings (Røttingen *et al.*, 2013), the translation of these interventions into routine clinical practice is often a slow process, and one that necessarily involves healthcare professional behaviour change (McGlynn *et al.*, 2003; Woolf, 2008; Grimshaw *et al.*, 2012), amongst other factors (May *et al.*, 2009). Changing healthcare professionals' behaviour can be challenging, particularly if it involves changing existing, routinised ways of providing care developed through training, experience and further reinforced through daily repetition (Naikoba and Hayward, 2001; French *et al.*, 2010; Brennan and Mattick, 2013). To address this issue, the past two decades have seen the emergence of the application of theories and methods from health psychology and the behavioural sciences to understanding and changing healthcare professional behaviours. As a result, there is an increasing body of theory-based research demonstrating that the theories and models used to understand and predict health behaviours are equally useful in identifying modifiable psychological determinants of healthcare professional behaviour (Walker *et al.*, 2003; Clarkson *et al.*, 2008; Godin *et al.*, 2008; Eccles *et al.*, 2011). A theory-based approach to understanding healthcare professional behaviour facilitates the development of a cumulative evidence to inform the design of interventions to support healthcare professionals in changing their clinical behaviours. Furthermore, this approach supports the implementation of new interventions, whilst stopping the use of ineffective interventions that are often costly (Michie *et al.*, 2005; Davidoff *et al.*, 2015).

To date, there has been a predominant focus on testing the utility of social cognitive models (e.g. Theory of Planned Behaviour (TPB); Ajzen) for predicting healthcare professionals' behaviours relating to clinical practice (e.g., prescribing, examining, or referring patients) (Harrell and Bennett, 1974; Lambert *et al.*, 1997; Gilomen, 1998; Eccles *et al.*, 2007) and the use of clinical

guidelines (Kortteisto *et al.*, 2010). These findings have demonstrated that indeed, social cognition models used in health psychology to predict and understand health behaviours (McEachan *et al.*, 2011) also apply to predicting healthcare professionals' behaviours. For instance, Godin and colleagues identified 16 prospective studies testing whether social cognition models could predict healthcare professionals' behaviour and showed a frequency weighted mean R^2 of 0.31 across studies (Godin *et al.*, 2008). Such findings are largely consistent with, in order of magnitude of effect, to those observed in reviews testing similar models with health behaviours in patients and the public (McEachan *et al.*, 2011; Sniehotta *et al.*, 2014).

A social cognition model-based approach assumes that healthcare professional behaviour is driven by a reflective decision-making process, including intention (or motivation). A criticism of social cognition models is that they do not explicitly theorise or account for the impact that implicit processes such as habit have on behaviour (Aarts, 2007; Hofmann *et al.*, 2008; Sheeran *et al.*, 2013; Gardner, 2014) or indeed healthcare professional behaviour (Nilsen *et al.*, 2012; Presseau *et al.*, 2014)

Dual-process models complement social cognition models by adding an impulsive pathway to behaviour that operates in parallel to the reflective pathway (Sladek *et al.*, 2006; Hofmann *et al.*, 2008). The reflective pathway includes conscious and effortful decision-making, a perspective that is consistent with good healthcare clinical practice, such as weighing the pros and cons of a specific type of medication to prescribe. The impulsive pathway includes processes such as habit, which is characterised by environmentally-cued responses that are enacted fast and effortlessly without conscious awareness (Hofmann *et al.*, 2008; Gardner, 2014). For example, healthcare professionals may receive automatically generated pop-ups via electronic patient records that prompt them to automatically provide a specific clinical service (Shojania *et al.*, 2009). Research by Presseau and colleagues (2014) found that the impulsive component of healthcare professional behaviour is a consistent predictor of guideline-recommended diabetes care, alongside reflective processes. Dual process approaches may therefore be useful because they provide a more comprehensive understanding of the factors that determine healthcare professionals' behaviours.

Habit develops through context-dependent repetition of a specific behaviour until this behaviour becomes an automatic response to a cue rather than resulting from an active decision-making process (Lally *et al.*, 2010). For example, healthcare professionals working in diabetes care routinely examine the feet of their patients for sensation and blood circulation (Presseau *et al.*, 2014). This examination behaviour is repeated during many consultations (e.g., annual reviews), is performed in a stable context (e.g., examination room) and is often prompted by a contextual cue (e.g., computer reminder). There are many other behaviours in healthcare practices that have similar properties and that might therefore be driven by both reflective and impulsive processes (e.g., prescribing medications, providing health behaviour advice, and hand washing).

A systematic review and meta-analysis published by Gardner, de Bruijn and Lally (2011) reviewed studies that investigated the association between habit (as measured by the Self-Reported Habit Index (SRHI; Verplanken and Orbell, 2003) and health behaviours (i.e. nutrition and physical activity behaviours) in a general population. This study identified 23 habit-behaviour correlations across 22 studies and found a medium-to-strong association (fixed: $r_+ = 0.44$; random: $r_+ = 0.46$) (Gardner *et al.*, 2011). However, to the authors' knowledge there is currently no systematic review reporting on the impulsive pathway or habit that synthesises the evidence in relation to healthcare professionals' behaviour.

The primary aim of this systematic review was to synthesise the overall strength of association between indicators of habit and healthcare professional behaviour. A secondary aim was to investigate whether *a priori* defined moderators could potentially explain the strength of the habit-behaviour association including experience, professional role, type of behaviour measure and type of behaviour. It was hypothesised that the association between habit and behaviour would be stronger in experienced healthcare professionals, as they would have repeated the same behaviours more frequently over the years. This is in line with dual process models (Benner, 1982; Reyna, 2008) which predict that experts often rely on intuitive reasoning rather than using more analytical reasoning. The current study also aimed to examine whether professional role (e.g., General Practitioners [GP] vs. nurses) could have an effect on the strength of the habit-behaviour association. It was hypothesised that some roles would require performing specific behaviours more frequently

which would increase habit strength (e.g., doctors prescribe medication more frequently than nurses) (Godin *et al.*, 2008). With regards to the type of behaviour it was hypothesised that habit might play a more important role in behaviours that are performed frequently in a stable context with a clear cue preceding the behaviour (e.g., examining behaviours) (Gardner, 2014). Lastly, it was hypothesised that the habit-behaviour association would be stronger if behaviour was measured via self-report, because this may inflate the observed effect (Paulhus, 1986).

5.3 Method

5.3.1 *Search strategy and study selection*

This systematic review followed a registered protocol: http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42015020024. Electronic databases (MEDLINE, PsycINFO, EMBASE, Scopus and CINAHL) were searched for relevant studies published until February 29, 2016 (an example search strategy developed for PsycINFO can be found in Appendix J). A comprehensive search strategy was used, combining keywords, MeSH headings, and synonyms of the terms habit, intention and healthcare professionals. Two researchers (SP and MM) independently screened all references obtained during the search in two stages against predefined eligibility criteria. Stage 1 screening involved screening titles, abstracts, and keywords to source potentially relevant studies. Stage 2 screening involved full-text screening of all articles retained at stage 1. A third reviewer (JP) was consulted to resolve any discrepancies in order to reach a final decision on the articles retained for review.

5.3.2 *Study inclusion and exclusion criteria*

Studies were included that quantitatively assessed the association between habit and healthcare professional care delivery behaviour. Published full-text studies were included only if they were written in English and reported analyses of primary data of the following research designs: randomised controlled trials (RCTs), cluster-randomised controlled trials, prospective cohort studies, and cross-sectional studies. Studies could include any healthcare professionals, excluding students, who were involved in delivering care to patients. Studies had to report an objective (e.g. electronic patient records) and/or self-reported

(e.g. questionnaire) measure of habit and healthcare professional behaviour. Importantly, studies had to report measures of habit and healthcare professional behaviour separately, as habit was defined as a separate construct, predicting behaviour. Healthcare professional behaviour was defined as any behaviour performed in the clinical environment. It was agreed that studies using these measures in a simulated setting would also be retained for review. Studies from a variety of healthcare settings were eligible for inclusion (e.g. studies conducted in primary, secondary, tertiary and community healthcare settings from the public and private sector).

5.3.3 ***Study quality assessment***

Two reviewers (SP and MM) independently assessed the quality of included studies using an adapted version of the quality assessment tool for observational cohort and cross-sectional studies (see Appendix K) (National Institute of Health –Department of Health and Human Services—USA.gov). The tool assesses methodological criteria relating to study procedures, design, and outcome measure. For the sample size justification item it was agreed to use a cut-off point of a minimum of N = 118, which is the recommended number for the prediction of individual predictors in a regression analysis (Green, 1991; Tabachnick *et al.*, 2001). It was further agreed a 2-month cut-off for the item assessing the timeframe that would be sufficient to see an association between habit and behaviour. This timeframe was based on a study that showed that it took an average of 66 days for people from a general population sample to form a habit (Lally *et al.*, 2010). Both reviewers used the criteria listed in the tool to grade the quality of all included studies (good, fair or poor). Inter-rater agreement was calculated using Cohen's Kappa coefficient (Cohen, 1992). Researchers met to resolve any disagreements in quality assessment through discussion.

5.3.4 ***Data extraction***

Two reviewers (SP and MM) independently extracted data from all included studies using a standardised data extraction form assessing: sample size (open), study design (i.e., randomised controlled trials, cluster-randomised controlled trials, prospective studies, and cross-sectional studies), main theory used (open), population characteristics (i.e., role, age, gender and years of

experience), behavioural characteristics (i.e., definition and type of measure used to assess behaviour), correlation(s) between habit and healthcare professional behaviour, and means and standard deviations of healthcare professional behaviour and habit. For intervention studies, baseline measures of the correlation between habit and healthcare professional behaviour were extracted and combined for treatment and control groups. Baseline estimates were used to avoid an overestimation of the habit-behaviour relationship that could be expected when using post-intervention correlation estimates. A Cohen's Kappa cut-off point of 0.6 was applied to indicate a meaningful agreement between raters that would be expected beyond capitalisation of chance (McHugh, 2012).

5.3.5 ***Data synthesis***

To determine the overall strength of association between habit and healthcare professional behaviour (and intention and healthcare professional behaviour), a meta-analytical approach was undertaken. The strength of association between habit and healthcare professional behaviour was calculated using Pearson's product-moment correlation coefficients (*r*) (Pearson, 1929). For datasets that provided multiple behaviour outcomes and therefore multiple habit-behaviour correlations, a weighted mean combined correlation was used (e.g. a composite variable that corresponds to the mean correlation between habit A and behaviour A, and the mean of habit B and behaviour B) (Borenstein *et al.*, 2009).

Meta-analyses were conducted using Comprehensive Meta-Analysis Version 2 (CMA) software (Borenstein *et al.*, 2005). Random effects models were used to make inferences about the probable effects found in the populations from which the studies have been sampled (Borenstein *et al.*, 2009). Fisher's *Z* transformations were used to calculate the weighted average effect sizes (*r*+), and 95% confidence intervals (CIs) were calculated for each r+ value (Mudholkar, 1983). In accordance with Cohen's guidelines (Cohen, 1992), correlation coefficients of 0.10, 0.30, and 0.50 were judged to be small, medium, and large in size, respectively.

Statistical heterogeneity was assessed using Cochran's *Q* and *I*2 (Higgins *et al.*, 2003). *Q* assessed whether heterogeneity is present or absent, by testing the

null hypothesis that the observed variance in effects is no greater than would be expected by sampling error. *I*2 assesses the proportion of observed dispersion that is due to real differences in the true effect sizes. When *I*2 was over 75%, heterogeneity was judged as high, and when below 25% it was judged as low (Borenstein *et al.*, 2010).

Subgroup analyses were conducted to assess whether any of the moderator variables would have an effect on the habit-behaviour relationship. *Q* statistics were calculated to assess between-study variability (QB) associated with potential moderators and to assess heterogeneity within each the subgroups (QW) (Borenstein *et al.*, 2009). Publication bias was assessed by: 1) visual inspection of funnel plots and asymmetry; and 2) Egger's test (Sterne and Egger, 2001) to confirm the visual impression.

5.4 Results

5.4.1 *Study characteristics*

Nine studies met inclusion criteria for inclusion in the review, all of which were conducted in the United Kingdom (see Figure 10). The total sample size was N = 1,975 and the mean between-study sample size was N = 247. Seven studies utilised a cross-sectional design with only one measurement point and two studies utilising a prospective design with a baseline and a 12-month follow-up time point. Eight of the nine studies were part of three larger predictive studies (Bonetti *et al.*, 2006; Eccles *et al.*, 2007; Bonetti *et al.*, 2010; Grimshaw *et al.*, 2011; Eccles *et al.*, 2012; Presseau *et al.*, 2014; Presseau *et al.*, 2014) and one study was an independent RCT (Hrisos *et al.*, 2008). The studies reported 28 bivariate habit-behaviour relationships related to twelve different healthcare professional behaviours, including prescribing, advising and examining practices (see Table 7 for all included behaviours). Four studies included General Dental Practitioners and five studies examined General Medical Practitioners. Four studies included an objective measure of healthcare professional behaviour and seven studies included self-reported measures of behaviour, including simulated behaviour measures. Simulated behaviour measures included literature- and expert-informed clinical scenarios that were related to the behaviours of interest. Healthcare professionals were asked to

decide what actions they would take, and responses were summed to create a total score.

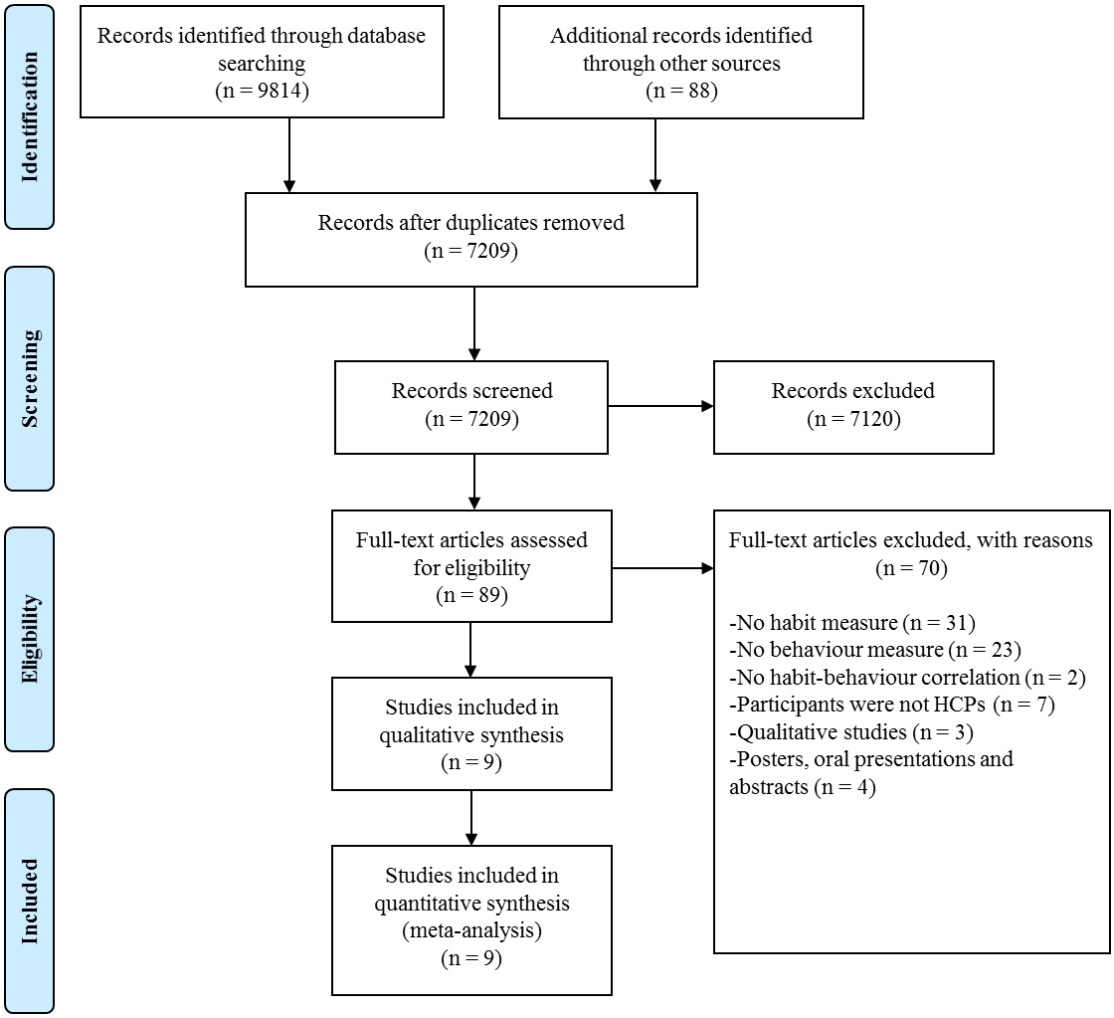


Figure 10 PRISMA flow diagram for search strategy

Table 7 Study characteristics

Study authors and year	Sample size, respondents, country	Study Design	HCP behaviour measure(s) (objective or self-report and description)	Habit measure (number of items)	Habit measure reliability index[1]	Habit mean (SD)	Habit possible scale range	Theories used that included habit
Bonetti et al. 2006	N = 214 General dental practitioners, Scotland	Cross-sectional	Objective: Number of intraoral radiographs taken per course of treatment	Self-reported: Evidence of habit (2)	0.62	7.6 (2.6)	2-14	Operant Learning Theory
Bonetti et al. 2009	N = 133 General dental practitioners, Scotland	Cross-sectional	Objective: placing fissure sealants on teeth	Self-reported: Evidence of habit (2)	0.89	9.0 (4.0)	2-14	Operant Learning Theory
Bonetti et al. 2010	N = 120 General dental practitioners, Scotland	Cross-sectional	Self-reported (behavioural simulation): Placing preventive fissure sealants	Self-reported: Evidence of habitual behaviour (3)	0.86	4.37 (1.61)	3-21	Operant Learning Theory
Eccles et al. 2007	N = 227 General Practitioners, United Kingdom	Cross-sectional	Objective: Managing upper respiratory tract infections without antibiotics	Self-reported: Evidence of habitual behaviour (2)	0.70	4.7 (2.1)	2-14	Operant Learning Theory

Eccles et al. 2007	N = 252 General Practitioners, United Kingdom	Cross-sectional	Self-reported (behavioural simulation): Managing upper respiratory tract without antibiotics	Self-reported: Evidence of habitual behaviour (2)	0.70	4.7 (2.1)	2-14	Operant Learning Theory
Eccles et al. 2012	N = 130 General dental practitioners, United Kingdom	Cross-sectional	Objective: Taking dental radiographs	Self-reported: Evidence of habit (3)	0.86	13.2 (4.2)	3-21	Learning Theory
Eccles et al. 2012	N = 130 General dental practitioners, United Kingdom	Cross-sectional	Self-reported (simulated behaviour): Taking dental radiographs	Self-reported: Evidence of habit (3)	0.86	13.2 (4.2)	3-21	Learning Theory
Grimshaw et al. 2011	N = 287 General Practitioners, United Kingdom	Cross-sectional	Objective: Managing low back pain without ordering lumbar spine x-rays	Self-report: Evidence of habit (2)	0.60	3.3 (1.7)	2-14	Learning Theory
Grimshaw et al. 2011	N = 297 General Practitioners, United Kingdom	Cross-sectional	Self-reported (simulated behaviour): Managing low back pain without ordering lumbar spine x-rays	Self-report: Evidence of habit (2)	0.60	3.3 (1.7)	2-14	Learning Theory
Hrisos et al. 2008	N = 340 (post-intervention booklet) General	Randomised controlled trial	Self-reported (behavioural simulation): Managing upper respiratory tract infection	Self-reported: Evidence of habit (2)	0.61	11.4 (2.1)	2-14	Operant Learning Theory

	Practitioners, United Kingdom		without prescribing antibiotics					
Presseau et al 2014a	N = 218 Primary care physicians, United Kingdom	Prospective	1/Self-reported (12-month follow-up): Providing advice about weight management	1/Self-reported: Self-Report Habit Index (SRHI) (12)	0.93	4.82 (1.11)	7-84	NA
Presseau et al 2014a	N = 335 Primary care physicians, United Kingdom	Prospective	2/Self-reported (12-month follow-up): Prescribing to reduce blood pressure	2/Self-reported: Self-Report Habit Index (SRHI) (12)	0.94	4.25 (1.21)	7-84	NA
Presseau et al 2014a	N = 288 Primary care physicians, United Kingdom	Prospective	3/Self-reported (12-month follow-up): Examining foot sensation and circulation	3/Self-reported: Self-Report Habit Index (SRHI) (12)	0.96	4.57 (1.57)	7-84	NA
Presseau et al 2014a	N = 346 Primary care physicians, United Kingdom	Prospective	4/Self-reported (12-month follow-up): Providing advice about self-management	4/Self-reported: Self-Report Habit Index (SRHI) (12)	0.96	4.98 (1.32)	7-84	NA
Presseau et al 2014a	N = 332 Primary care physicians,	Prospective	5/Self-reported (12-month follow-up): Prescribing additional therapy for glycaemic control	5/Self-reported: Self-Report Habit Index (SRHI) (12)	0.95	4.42 (1.25)	7-84	NA

	United Kingdom							
Presseau et al 2014a	N = 417 Primary care physicians, United Kingdom	Prospective	6/Self-reported (12-month follow-up): Providing general education about diabetes	6/Self-reported: Self-Report Habit Index (SRHI) (12)	0.96	5.03 (1.30)	7-84	NA
Presseau et al 2014b	N = 218 Primary care physicians, United Kingdom	Prospective	1/Self-reported (12-month follow-up): Giving advice about weight management	1/Self-reported: Self-Report Behavioural Automaticity Index (SRBAI) (4)	0.87	4.81 (1.28)	4-28	Dual Process Model
Presseau et al 2014b	N = 335 Primary care physicians, United Kingdom	Prospective	2/Self-reported (12-month follow-up): Prescribing to reduce blood pressure	2/Self-reported: Self-Report Behavioural Automaticity Index (SRBAI) (4)	0.87	3.98 (1.31)	4-28	Dual Process Model
Presseau et al 2014b	N = 288 Primary care physicians, United Kingdom	Prospective	3/Self-reported (12-month follow-up): Examining foot sensation and circulation	3/Self-reported: Self-Report Behavioural Automaticity Index (SRBAI) (4)	0.87	4.71 (1.32)	4-28	Dual Process Model
Presseau et al 2014b	N = 346 Primary care physicians, United Kingdom	Prospective	4/Self-reported (12-month follow-up): Providing advice about self-management	4/Self-reported: Self-Report Behavioural Automaticity Index (SRBAI) (4)	0.87	4.98 (1.48)	4-28	Dual Process Model

Presseau et al 2014b	N = 332 Primary care physicians, United Kingdom	Prospective	5/Self-reported (12-month follow-up): Prescribing additional therapy for glycaemic control	5/Self-reported: Self-Report Behavioural Automaticity Index (SRBAI) (4)	0.87	4.82 (1.28)	4-28	Dual Process Model
Presseau et al 2014b	N = 417 Primary care physicians, United Kingdom	Prospective	6/Self-reported (12-month follow-up): Providing general education about diabetes	6/Self-reported: Self-Report Behavioural Automaticity Index (SRBAI) (4)	0.87	4.98 (1.48)	4-28	Dual Process Model

Habit was measured using self-reported questionnaires in all included studies, with seven studies using the 2-3 item 'Evidence of Habit' measure (Blackman, 1974; Walker *et al.*, 2003; Bonetti *et al.*, 2006; Bonetti *et al.*, 2009; Bonetti *et al.*, 2010), one study using the twelve-item Self-Reported Habit Index (SRHI; Verplanken and Orbell, 2003; Presseau *et al.*, 2014), and one study using the 4-item Self-Reported Behavioural Automaticity Index (SRBAI; Gardner *et al.*, 2012; Presseau *et al.*, 2014). Alpha coefficients for the habit measures ranged from α = 0.50 to α = 0.96, with the majority of the alphas falling in the acceptable (α = 0.70) to good (α = 0.90) range. The measure 'Evidence of Habit' used two or three items that followed a stem (e.g., 'When I see a patient') and focused on the automaticity facet of habit (e.g., 'I automatically consider taking a radiograph'). The SRHI included a stem describing the behaviour (e.g., 'Providing advice about weight management') and the target (e.g., 'to patients whose BMI is above target is something...') followed by twelve items that described three facets of automaticity –lack of awareness ('…I do without thinking'), lack of control ('…that would require effort not to do'), and efficiency ('…I have no need to think about doing') – behavioural frequency ('…I do frequently') and self-identity ('…that's typically "me"). The SRBAI index used a subset of items of the SRHI, focusing on the automaticity aspect of habit. Eight of the nine studies assessed habit as part of an operationalization of Operant Learning Theory (Blackman, 1974) and one study applied a Dual Processing approach that included habit.

5.4.2 ***Study quality***

Table 8 describes the outcome of the methodological quality assessment. In summary, seven studies were rated as fair (Bonetti *et al.*, 2006; Eccles *et al.*, 2006; Hrisos *et al.*, 2008; Bonetti *et al.*, 2009; Bonetti *et al.*, 2010; Grimshaw *et al.*, 2011; Eccles *et al.*, 2012), two studies rated as good quality (Presseau *et al.*, 2014; Presseau *et al.*, 2014) and no studies were rated as poor. The limitations of the studies that were rated as fair related to the design used to test the habit-behaviour relationship (i.e. cross-sectional), and the low response rates (i.e. ranging between 21-48%). Studies that were rated as good had prospective designs, whereby habit was measured prior to behaviour, therefore

allowing inferences regarding temporal sequencing. They also reported response rates greater than 50%

Table 8 Quality assessment

Study ID	Bonetti et al. 2006	Bonetti et al. 2009	Bonetti et al. 2010	Eccles et al. 2007	Eccles et al. 2012	Grimshaw et al. 2011	Hrisos et al 2008	Presseau et al. 2014a	Presseau et al. 2014b
1. Research question stated?	YES	YES	YES	YES	YES	YES	YES	YES	YES
2. Study population clearly defined?	YES	YES	YES	YES	YES	YES	YES	YES	YES
3. Participation rate >50% at baseline?	NO	YES	NO	NO	NO	NO	NO	YES	YES
4. Inclusion/exclusion criteria pre-specified?	YES	YES	YES	YES	YES	YES	YES	YES	YES
5. Sample size justification provided?	YES	YES	YES	YES	YES	YES	YES	YES	YES
6. Habit measured prior to behaviour?	NO	NO	NO	NO	NO	NO	NO	YES	YES
7. Timeframe between baseline and follow-up >2-months?	NO	NO	NO	NO	NO	NO	NO	YES	YES
8. Habit measured as continuous variable?	YES	YES	YES	YES	YES	YES	YES	YES	YES
9. Habit measure clearly defined, valid and reliable?	YES	YES	YES	YES	YES	YES	YES	YES	YES
10. Habit assessed more than once?	NO	NO	NO	NO	NO	NO	YES	NO	NO

11. Behaviour measure clearly defined, valid, and reliable?	YES	YES	YES	YES	YES	YES	YES	YES	YES
12. Outcome assessors blinded to exposure status?	NA	NA	NA	NA	NA	NA	CD	NA	NA
13. Loss to follow-up after baseline <20%	NA	NA	NA	NA	NA	NA	YES	YES	YES
14. Adjusted for confounders?	YES	YES	YES	YES	YES	YES	YES	YES	YES
15. Overall quality (Good, Fair, or Poor)	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Good	Good
Note. CD=cannot determine; N/A=not applicable; NR=not reported									

5.4.3 *Habit-behaviour correlations*

The raw data file that was inputted in CMA can be found in Appendix L. The combined correlation between habit and healthcare professional behaviour across all studies was r+ = 0.35 (k = 9, 95% CI [0.30, 0.38], p < 0.001), suggesting a moderate association (see Figure 11). In four studies the observed correlation was small (i.e. r < 0.30; Bonetti *et al.*, 2006; Hrisos *et al.*, 2008; Grimshaw *et al.*, 2011; Eccles *et al.*, 2012) and the remaining five studies had moderate effects (i.e. r < 0.40; Bonetti *et al.*, 2009; Presseau *et al.*, 2014; Presseau *et al.*, 2014). Visual inspection of residual plots indicated that there were no outliers. A large degree of heterogeneity around the mean was detected (Q = 37.27, p < 0.001; I2 = 78.54), suggesting that the variance could not be explained by sampling error alone. Visual inspection of the funnel plots did not reveal any asymmetry, confirmed by the Egger's test (p > 0.05), indicating that there was a small likelihood of publication bias.

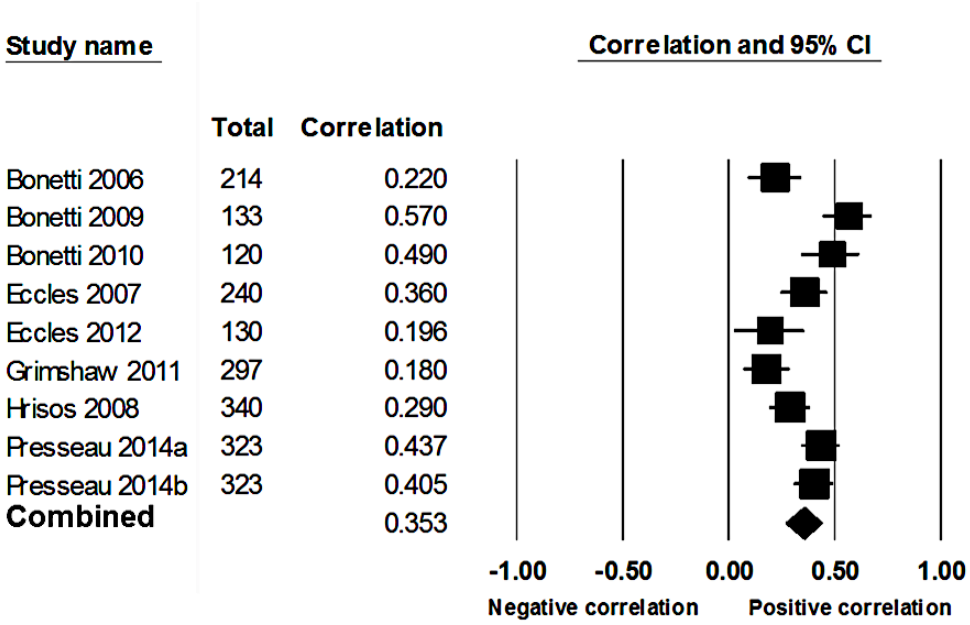


Figure 11 Forest plot of pooled correlation between habit and healthcare professional behaviour. For studies that used multiple behaviour outcomes, mean within-study correlations were used to calculate the pooled between-study habit-behaviour correlation

5.4.4 *Moderator analyses*

Subgroup analyses were performed for the two moderators, including type of measure and type of behaviour. There was insufficient data available to analyse subgroups for experience and professional role.

Type of measure. Subgroup analyses were conducted to examine whether the type of measure of behaviour used (objective vs. self-reported) had an effect on the observed strength of association between habit and healthcare professional behaviour. For the objective measures, the combined correlation between habit and healthcare professional behaviour across all four studies was r+ = 0.29 (k = 4, 95% CI [15%, 43%], p < 0.001) (see Figure 12). The combined correlation between habit and healthcare professional behaviour for self-reported measures across all seven studies was r+ = 0.36 (k = 7, 95% CI [26%, 46%], p < 0.001) (see Figure 12). This difference was not significant (Q = 0.83, p = 0.36).

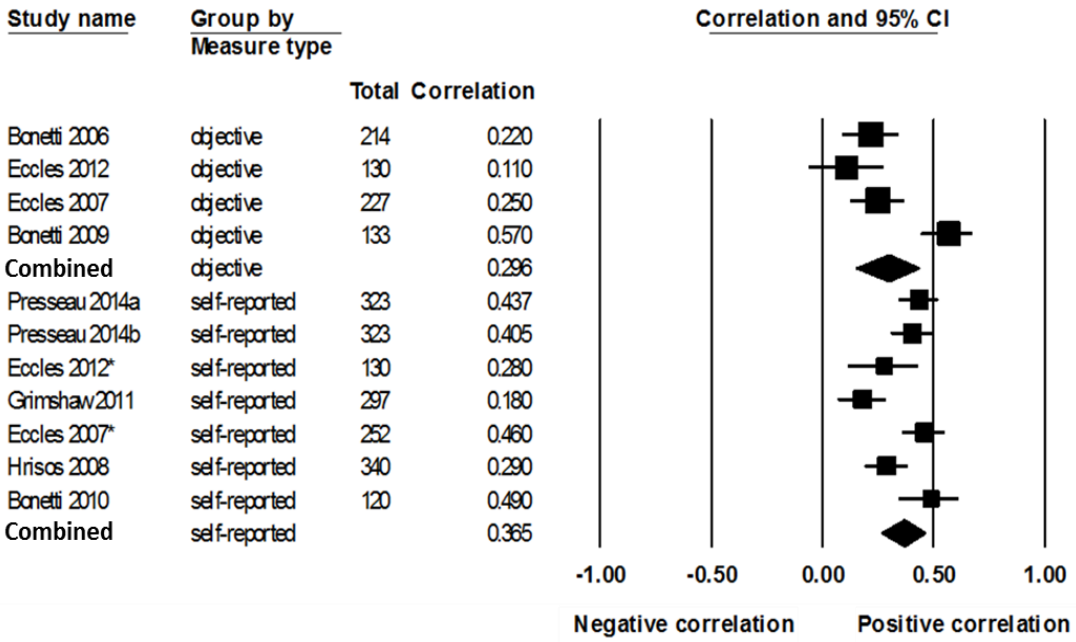


Figure 12 Forest plot of pooled correlations between habit and healthcare professional behaviour grouped by type of behaviour measure

Type of behaviour. The type of behaviours reported was categorised into five categories, namely: advising, examining, prescribing, providing dental treatment and referring. Due to the limited number of studies per subgroup of behaviours

(*k* = 1 to *k* = 3), it was not possible to conduct meta-analytical procedures, therefore results were narratively synthesised. Figure 13 shows the pooled correlation coefficients per subgroup. There was a positive correlation between habit and all five behavioural categories. The largest combined correlation was found between habit and examining behaviours (*r*+ = 0.69), however this category only included one study. The second largest combined correlation was found between habit and providing dental treatment (*r*+ = 0.53), again this result has to be interpreted with caution as there were only two studies in this category. The size of the combined correlations between habit and advising/prescribing behaviours were medium (*k* = 1, *r*+ = 0.37 and *k* = 3, r+ = 0.32, respectively). A small combined correlation was estimated for habit and referring (*k* = 3, *r*+ = 0.19).

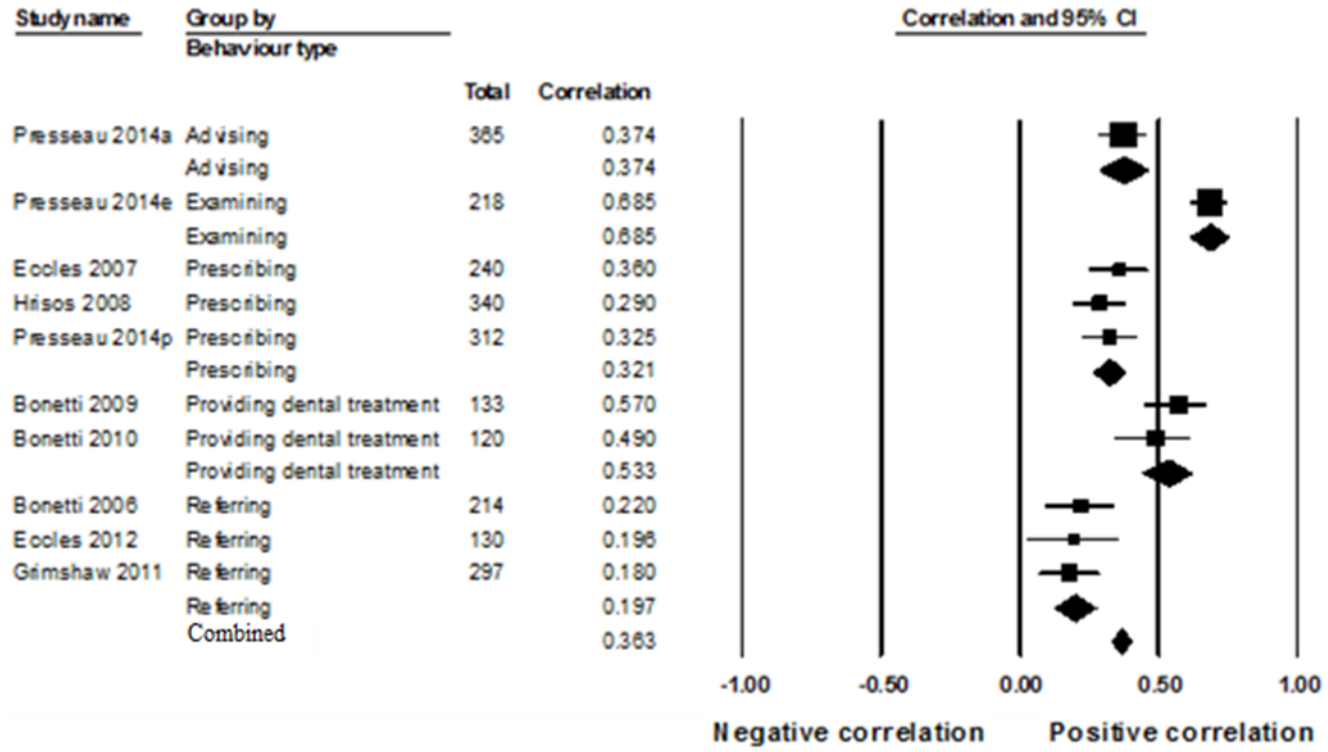


Figure 13 Forest plot of pooled correlation between habit and healthcare professional behaviour grouped by behaviour type

5.5 Discussion

The literature was systematically reviewed for studies that sought to quantify the overall strength of association between habit and healthcare professional behaviour by means of meta-analysis. Given the continued need for updating clinical practice in the light of new research evidence and the persistent finding that the transfer of such evidence into practice remains challenging, there is a need to better understand the factors that promote and limit healthcare professional behaviour change. This systematic review highlights the importance of addressing habit when designing and evaluating interventions that aim to change healthcare professional behaviour.

The combined correlation between habit and healthcare professional behaviour was $r+ = 0.35$. This correlation is smaller than the combined correlation that was estimated in the review published by Gardner and colleagues (2011) ($r+ = 0.44$), that looked at habit and health behaviours in a general population sample. One explanation for the smaller correlation could be that the review by Gardner and colleagues (2011) included two very narrowly defined behavioural categories (i.e. nutrition and physical activity behaviours), whereas the current review included a range of different healthcare professional behaviours, summarised in five broader categories (i.e. advising, examining, prescribing, providing dental treatment and referring). Furthermore, the review by Gardner and colleagues (2011) was also restricted to applications of the Self-Reported Habit Index (SRHI), whereas this review included three different types of habit measures, which could have increased the level of heterogeneity.

The strength of the association between habit and healthcare professional behaviour did not significantly differ depending on how behaviour was assessed (objective vs. self-report). In line with previous research (Godin *et al.*, 2008) the combined correlation between habit and objective measures of behaviour was slightly smaller ($r+ = 0.29$) when compared to that between habit and self-reported measures of behaviour ($r+ = 0.36$), however this difference was not significant, possibly due to the limited amount of studies included in each category.

An exploratory analyses was conducted to test whether the type of behaviour would affect the strength of association between habit and healthcare professional behaviour. Unfortunately, some categories included only one or two behaviours, therefore more formal statistical analyses were not possible. However, there was some indication that habit may be particularly important in examining (i.e. examining diabetic feet) and providing dental treatment (i.e. placing of fissure sealant) and of less importance in referring (i.e. taking dental radiographs). One explanation could be that behaviours such as examining might be performed more regularly and preceded by a clear cue (e.g. computerised prompt). Referring, on the other hand might require more deliberate decision-making, as the healthcare professional needs to consider the pros and cons of such a decision. These findings highlight the importance of investigating the nature of behaviours that are more or less conducive to habit formation. There is already evidence to show that behavioural frequency and stability of the context may be two key characteristics, which may help distinguish between habitual and non-habitual behaviours (i.e., behaviours that are performed more frequently in a stable context are more likely to become habitual) (Ouellette and Wood, 1998). Further research may uncover additional behavioural characteristics that could help distinguish between habitual and non-habitual behaviours. Such research could adopt a top-down approach using theory to predict which behaviours are more conducive to habit formation (Deutsch and Strack, 2008) or a bottom-up approach using a data-driven process of generating behavioural categories (e.g., using interviews and focus groups) (McEachan *et al.*, 2010).

All the studies summarised in this review relied on self-reported measures of habit strength. Examining habit using self-reported measures is problematic because one of the defining facets of habit is that it operates outside a person's awareness. This means that when participants were asked to rate to what extent a given behaviour was automatic they were most likely making an inference about their behaviour based on the consequence of the habit (e.g., hand washing habit inferred from empty soap dispenser) (Sniehotta and Presseau, 2012). Another issue is the construct validity of measures such as the SRHI, which may be conflated with constructs that are not necessarily part of habit (i.e., behaviour frequency and self-identity) (Gardner, 2014). The SRBAI

which is a subscale of the SRHI which focuses on automaticity as the core facet of habit, may offer a theoretically parsimonious alternative that can be administered in a healthcare setting with little response burden (Gardner *et al.*, 2012). When using any of the self-reported habit measures (i.e., Evidence of Habit, SRHI, or SRBAI) to predict behaviour it is important that the measure includes the contextual cue that prompts the behaviour (e.g. 'Behaviour X in Context Y is something I do automatically') (Sniehotta and Presseau, 2012). For example, one could ask a GP to rate whether 'Prescribing an additional drug' (behaviour) 'for any patient whose blood pressure is above target' (context) is something he/she does automatically. This review did not identify any other forms of habit measures used in the clinical setting, however there are alternative and possibly more accurate ways of measuring habit. For example, video observations in combination with qualitative analyses (e.g., conversation analysis) might offer a promising way of examining cues and habitual behaviours by studying interaction, acknowledging both verbal and non-verbal cues (Drew *et al.*, 2001).

Overall, the results highlight the importance of habit and the role of implicit, cue-driven processes that underlie healthcare professional behaviour. Initially healthcare professional behaviour may be driven by intention and reflective decision-making, however as behaviour is repeated frequently in a consistent context, behavioural control may shift to automatic and context-driven processes. Given the nature of healthcare behaviour being inherently tied to a specific physical location, there is reason to suspect that habit is a particularly relevant construct in this population, which is borne out by the findings in this review. This is in line with dual process approaches which suggest that behaviour is determined by both reflective and impulsive processes which operate in parallel (Strack and Deutsch, 2004; Presseau *et al.*, 2014).

These results have implications for intervention design. Intervention developers could consider using strategies that support healthcare professionals with creating and breaking habitual behaviours. The formation of new habitual behaviours could be informed by national practice guidelines, which are often based on clinical research evidence (e.g., UK: National Institute for Health and Care Excellence [NICE]). One key to initiating a new habit is the consistent repetition of a behaviour in a stable context (Lally *et al.*, 2010). Intervention

developers could consider using volitional strategies such as action planning that may support healthcare professionals with building cue-response links that increase behavioural repetition and that underlie habit (Gollwitzer, 1999; Sniehotta *et al.*, 2005; Casper, 2008; Hagger *et al.*, 2016; Potthoff *et al.*, 2017). An example of an action plan could be: “When a patient presents with a common cold, then I will advise to re-consult if there is a significant worsening of symptoms”. Once a new habit has been initiated it is essential to maintain behavioural repetition and to protect the new habit against other competing contextual cues (e.g., patient asking for an antibiotic prescription) that might trigger unfavourable habitual behaviours (e.g., unnecessary prescribing). Coping planning is a technique whereby healthcare professionals could anticipate potential barriers to the new habit and formulate alternative behaviours to overcome them and to ensure behavioural repetition (e.g., “When a patient presents with a common cold and asks for an antibiotic, then I will provide reassurance that antibiotics are not needed immediately because they are likely to make little difference to symptoms and may have side effects) (Sniehotta *et al.*, 2005; Avery *et al.*, 2014; Presseau *et al.*, 2014). Planning interventions have the advantage that they are intuitive and parsimonious and they can be delivered in a cost-effective way, using various delivery modes (e.g., pen-and-paper or internet-based) (Hagger and Luszczynska, 2014). Volitional strategies (i.e., action and coping planning) to promote habit formation could further be augmented by changing the context in which healthcare is routinely delivered and thereby making cognitive control easier (Allan *et al.*, 2013). The use of electronic reminders (Shojania *et al.*, 2009) might prove particularly useful to support the formation of habitual behaviours that are in line with evidence-based guidelines (Meeker *et al.*, 2014).

A better understanding of the factors that support and undermine change in healthcare professionals has wider implications for health psychology. Health psychologists are constantly developing health behaviour change interventions that are designed to be delivered by healthcare professionals both in the context of trials, and if effective, subsequently implemented in the ‘real world’. Throughout this process, including study design, training, delivery, receipt and enactment of an intervention it is important to maintain a high level of fidelity (Borrelli, 2011). For example, fidelity can be preserved through the provision of

healthcare professional training. The training needs to provide healthcare professionals with the necessary competencies to properly deliver an intervention, which could include habit change interventions. Thus, the fidelity of delivery and impact of health behaviour change interventions depends on properly understanding drivers of healthcare professional behaviour change.

This systematic review highlighted that most current studies assessed habit and behaviour at the same time, which is problematic because in order to demonstrate cause and effect one would need a design whereby the independent variable (e.g., habit) precedes the dependent variable (e.g., healthcare professional behaviour). Another problem associated with cross-sectional designs is common method variance, in cases where the same measurement type was used at the same time point (i.e. questionnaires for all measures) (Lindell and Whitney, 2001). The problem of common method variance does not apply to those studies which measured healthcare professional behaviour using objective measures (i.e. medical records), however there were only four studies that included these measures (Bonetti *et al.*, 2006; Eccles *et al.*, 2007; Bonetti *et al.*, 2009; Eccles *et al.*, 2012). Another limitation was the low response rate (below 50%) in seven of the nine studies. These results compare unfavourably with other postal survey studies in healthcare professionals which typically have response rates of at least 61% (Cook *et al.*, 2009). Future studies should try to incorporate effective recruitment and retention strategies, using financial compensation or other ways of rewarding completion of questionnaires (Flodgren *et al.*, 2011).

The current review is limited in the range of search terms it utilised in the title and abstract field. For habit the search terms learning, operant, automaticity and past behaviour were used, however there is a range of other terms that could have been utilised including, routine, norm, custom, and learnt response. Equally, the search strategy could have included alternative terms for intention. For example, the terms willingness, expectation, or motivation could have been included. The exclusion of some of the terms mentioned above was to some extend mitigated by using thesaurus terms of the individual databases (e.g., MeSH [Medical Subject Headings]), which included additional subheadings for each of the main search terms (e.g., routine and habituation for habit or planned behaviour and reasoned action for intention).

Although a significant overall correlation was found between habit and healthcare professional behaviour, there was also a high level of heterogeneity between studies that could not (fully) be accounted for by the moderators that were examined. The limited number of studies included in this review limits the conclusions that can be drawn from the moderator analyses, because non-significant effects may be due to low statistical power (Borenstein *et al.*, 2009). Future studies should continue to explore other potential moderators that can account for differences between trial results. Although inspection of publication bias did not reveal significant asymmetry in the present review, this may be because of low power in detecting real asymmetries as a result of the limited number of studies.

5.6 Conclusion

To the authors' knowledge this was the first systematic review that aimed to quantify the strength of association between habit and healthcare professional behaviour. The review showed that many aspects of health care have an element of routine. Habits allow healthcare professionals to act fast and efficiently in the clinical context and are an adaptive way of providing quality healthcare. However, when clinical guidelines of best practice change as new evidence and new interventions come to light, so too must behaviour. This review discussed current conceptualisations of habit and how these relate to healthcare professional behaviour. Furthermore, the importance of addressing both reflective and impulsive processes that underlie healthcare professional behaviour was highlighted and recommendations for interventions addressing habit change were provided.

Chapter 6. General discussion and conclusion

6.1 Summary

Implementation science is the study of methods to facilitate the uptake of research findings into routine practice and regularly involves the application of theories from behavioural science to better understand healthcare professional behaviour. Social cognitive models are a class of behavioural theories and have been used to understand healthcare professional behaviour. However, they tend to emphasise the role of reflective constructs when explaining healthcare professional behaviour (e.g., intention) with less (or no) emphasis on hypothesising about the role of implicit processes such as habit. Habit can be defined as a learned tendency to perform a behaviour automatically in response to cues. Importantly, contrary to its lay usage, ‘habit’ is not a behaviour but rather a construct that can add to the prediction, understanding and explanation of behaviour. Dual process approaches have the potential to make a contribution to implementation research by delineating how both reflective and impulsive processes work in parallel to regulate healthcare professional behaviour. This thesis presented four studies and used mixed-methods to investigate the role of habit in relation to healthcare professional behaviour, focusing on clinical behaviours in the context of diabetes care.

This final chapter summarises and discusses the key findings across studies and highlights theoretical and practical implications that suggest directions for future research using dual process approaches. This chapter first considers the evidence for habit as a predictor of healthcare professional behaviour. The evidence is then discussed in relation to how qualitative and quantitative studies in this thesis contribute to existing literature. Next, implementation and de-implementation are conceptualised from the perspective of habit change with a view towards highlighting implications for intervention development. In addition, implications for measurement, theory and the wider implementation literature are considered including the potential influence of multiple goal pursuit on healthcare professional behaviour in relation to habit. Overall strengths and limitations of the thesis are discussed followed by suggestions for future research based on the findings presented in the thesis.

6.2 Habit as a predictor of healthcare professional behaviour

Healthcare professional behaviour change is an important aspect to improving the uptake of evidence into healthcare practice (Grimshaw *et al.*, 2012). Theory-based qualitative methods are regularly use to identify and understand factors that may influence clinical behaviours (Francis *et al.*, 2004). Such qualitative studies often make use of reflective constructs (e.g., attitude, subjective norm, and perceived behavioural control) to better understand the experiences of healthcare professionals, however there is a relative lack of research that explicitly theorises about how implicit constructs such as habit relate to healthcare professional behaviour (Nilsen *et al.*, 2012).

The theory-based interview study presented in Chapter 2 showed that healthcare professionals who had started using the Diabetes UK Information Prescription (DUK IP; a self-management advise tool targeting: cholesterol, blood pressure and HbA1c) were able to describe how the use of the tool had become a habit. Healthcare professionals reported that it took them one to three months following the introduction of the DUK IP to form a '*subconscious way of using it [DUK IP]*' (see Chapter 2). The finding that habit is an important construct in relation to healthcare professional behaviour is in line with other qualitative research investigating healthcare professional behaviour. For example, one qualitative study investigating barriers and facilitators to hand hygiene in healthcare professionals (Dyson *et al.*, 2011). This study found that habit/routine (i.e., an automatic response to cues) was a facilitator of healthcare professionals' hand hygiene behaviour. Interestingly, this study also compared participants' responses when using a theory-based versus a non-theory based question schedule. The theory-based schedule led to a greater frequency of responses regarding routine/habit when compared to a schedule that was not based on theory. These findings are in agreement with Chapter 2, which applied a theory-based topic guide that successfully elicited responses regarding habit formation.

Another finding from the theory-based interview study (Chapter 2) was that different types of triggers can serve as a cue to healthcare professional behaviour. For example, a person asking for more information about physical activity to lose weight prompted healthcare professionals to make use of the

DUK IP. Such cues may have supported the habitual use of the DUK IP as it would have prompted healthcare professionals to repeatedly use the tool, which would have increased behavioural automaticity. The idea that patients can act as a cue to healthcare professional behaviour is consistent with research on antibiotic prescribing (De Sutter *et al.*, 2001). In the case of antibiotic prescribing patients can act as a cue to prompt an undesired behaviour (i.e., over-prescribing antibiotics for infection of sinuses). Taken together this evidence suggests that patients can facilitate the formation of new habits (e.g., use of DUK IP) as well as prompt old and sometimes undesired habits (e.g., overprescribing antibiotics) and therefore patient-mediated interventions may be a helpful approach to future habit formation research in healthcare professionals.

The qualitative insights regarding habit formation in healthcare professionals are also consistent with findings in the wider literature, including habit research in general population samples. Although healthcare professionals' clinical behaviours vary from behaviours observed in people from the general population (e.g., clinical behaviours are often highly structured, sometimes incentivised, with clear consequences to performance beyond the actor themselves) there may still be aspects of their behaviours that are comparable (Francis and Presseau, in press). For example, one qualitative study looked at habit formation in people that followed a habit-based weight loss programme. Participants in this study experienced the development of behavioural automaticity as a process that was taking place over time and that was facilitated by contextual cues (Lally *et al.*, 2011).

The finding that habit formation in healthcare professionals is a process that takes place over time is not surprising given the high levels of expertise that are obtained throughout clinical training and that are reinforced in daily practice. These findings are also in line with Novice to Expert Theory, which suggests that with increased experience behaviour moves more into the background of experience rather than being controlled by conscious processes (Benner, 1982). The theory also says that once expertise in a given field has been achieved, behaviour starts relying less on principles, rules or guidelines and that behaviour is enacted in a flexible and highly efficient way (Benner, 1982).

Another theory that speaks to these findings is Fuzzy Trace Theory (FTT), which is also known as the dual process theory of memory (Reyna, 2008). According to this theory people with a lot of experience form so called '*gist traces*', which are fuzzy representations of past events (i.e., bottom-line meaning) (Reyna, 2008). For example, expert healthcare professionals may prefer judging risks in terms of high or low, rather than thinking about risks in terms of probabilities. Such gist traces allow experienced healthcare professionals to make fast decisions, which is different from the type of reasoning utilised by less experienced healthcare professionals (i.e., their decisions are often based on slow '*verbatim reasoning*', which involves accessing detailed recollections such as ratio aspects) (Reyna, 2008).

Chapter 4 (secondary analysis) and Chapter 5 (systematic review and meta-analysis) present the same result utilising different methodology. Chapter 4 showed that habit is a predictor of six guideline recommended prescribing, advising, and examining behaviours in type 2 diabetes care. The same chapter also showed that habit acted as a mediator between two planning cognitions (action and coping planning) and clinical behaviour. Chapter 5 presents further quantitative evidence that habit accounts for significant variability in healthcare professional behaviour and that the strength of the habit-behaviour relationship is consistent with the intention-behaviour relationship. The systematic review showed that habit was a predictor of a range of different clinical behaviours, summarised in five broader categories (i.e. advising, examining, prescribing, providing dental treatment and referring). To the authors' knowledge this is the first systematic review and meta-analysis in a healthcare professional population that highlights the potential importance of considering a habitual component of behaviour.

These findings have the potential to inform interventions that aim to support healthcare professionals with creating and breaking habit. Before implications for possible intervention development are discussed it is necessary to consider possible arguments for and against the creation of habitual clinical behaviours. One argument for supporting the '*automatisation'* of healthcare professional behaviour is that once habit has formed, cognitive capacities are saved which can then be devoted to alternative tasks requiring more active engagement (e.g., maintaining a rapport with the patient) (Neal *et al.*, 2013). This can be

advantageous as long as the habitual behaviour is in line with guidelines of best practice. Habitual behaviours that are in line with guidelines further have the potential to make care more efficient, given that impulsive processes are believed to prompt behaviour quickly and effortlessly (Bargh, 1994). However, when unexpected problems or new situations arise, e.g. the patient presenting with symptoms that are unfamiliar to the healthcare professional, habitual responses may not be adequate and more deliberate problem solving may be required (Nilsen *et al.*, 2017). Furthermore, even though habitual behaviours can free up mental capacity for other tasks, there is research on automation from different fields which suggest that attention may drift and complacency develops when tasks can be solved without our full awareness (Carr, 2015). Lastly, while implied, its worthy of note that the formation of a new clinical habit may require breaking this habit once guidelines of best practice change.

6.3 Implementation and de-implementation conceptualised as habit change

Implementation and particularly de-implementation are a major focus of research in the implementation science, however there is little theory to guide these processes (Eccles *et al.*, 2005). There is potential to harness research around habit change to further theorising about implementation/de-implementation (Nilsen *et al.*, 2012; Nilsen *et al.*, 2017).

In this thesis implementation has been conceptualised as an effort to support healthcare professionals with building routines and habit. Likewise, effective implementation may need to involve stopping non-evidenced behaviours that are performed habitually (i.e., de-implementation). For example, Chapter 2 (qualitative study) described how some healthcare professionals who started piloting the DUK IP already had established ways of providing self-management advice to people with type 2 diabetes which partially conflicted with using the DUK IP. This finding is in line with a study which identified de-implementation as a key area of development within the implementation literature (Prasad and Ioannidis, 2014). The combined results of this thesis may provide some guidance on how to best support healthcare professionals with creating and breaking habit.

The secondary analysis in Chapter 4 showed that the positive relationship between planning (action and coping planning) and six guideline recommended prescribing, advising, and examining behaviours operated indirectly via habit. Even though these findings are based on correlational data and planning cognitions rather than active manipulation, they provide useful insights into the possible mechanisms of change underlying planning and habit formation. The results of the secondary analysis suggest that effective implementation or habit formation may require healthcare professionals to form active plans on when, where and how they will integrate a new practice into their routine. The observed relationship between planning, habit and behaviour suggests that healthcare professionals with a clear plan may have formed a mental link between a critical situation and an appropriate response (i.e., providing guideline recommended care). This mental link may have allowed healthcare professionals to react more habitually in these situations, rather than having to rely on deliberate and effortful decision-making each time. The same process could be utilised to support de-implementation or breaking of habitual behaviours that are not in line with best evidence. In those instances, action and/or coping planning could be used to substitute old behavioural responses to a cue with more appropriate, evidence-based responses.

The results of the secondary analysis presented in Chapter 4 are in line with the growing number of studies that have proven the effectiveness of planning interventions (i.e., as opposed to planning cognitions) (Casper, 2008; Ivers *et al.*, 2013; Presseau *et al.*, 2013; Verbiest *et al.*, 2013; Verbiest *et al.*, 2014). Even though these studies provide evidence for the usefulness of conditional planning interventions for implementation research, they do not use formal process evaluations to show through which mechanisms planning asserts its' effects on healthcare professional behaviour. Therefore the findings of the secondary analysis in Chapter 4 of this thesis have the potential to inform such theory-based process evaluations that can be conducted alongside experimental or quasi-experimental studies (Grimshaw *et al.*, 2007). Furthermore, this approach is in line with recommendations by the Medical Research Council (MRC) guidance on process evaluation of complex interventions which includes mechanisms of impact such as mediators and pathways of intervention effects (Moore *et al.*, 2015). Chapter 3 presented an

intervention study as an example of how the findings from the secondary analysis in Chapter 4 could be used as a framework for process evaluation in an experimental study. This randomised controlled trial aimed to test whether a conditional planning intervention would be effective in supporting healthcare professionals with forming a habit of using the DUK IP. Although the study did not reach recruitment targets it provided useful insights into intervention design. For example, Chapter 3 explains how cues from a previous elicitation study (qualitative interviews in Chapter 2) can be used to inform an action and coping planning intervention using volitional help sheets. The cues identified in the study presented in Chapter 3 were used as the opportunities/barriers which could be combined with possible actions/solutions (Chapter 4). To the authors' knowledge the intervention study presented in Chapter 3 is the first that used web-based volitional help sheets to support healthcare professionals with forming a habit of using a new medical tool. The strategies used within the volitional help sheet have the potential to inform the design of simple interventions that have the potential to support healthcare professionals with habit change (Nilsen *et al.*, 2012; Presseau *et al.*, 2013).

Overall, this thesis proposes an integrated theory-based approach to intervention design using qualitative (Chapter 2) and quantitative (Chapters 3 and 4) methods and provides opportunities and suggestions for further research to determine whether planning does indeed support behaviour change by acting on underlying habit.

6.4 Implications

6.4.1 *Habit measurement*

The systematic review presented in Chapter 5 generated a number of findings one of which highlighted the consistent use of self-report measures when measuring habit in the context of healthcare professional behaviour. As such this limits the findings. For example, there are conceptual problems with self-reporting habit, as the process is often described as operating without the person being consciously aware of it (Bargh, 1994). Therefore, self-reported measures of habit may represent a reflection on the consequences of a behaviour, rather than a true estimate of behavioural automaticity (e.g., 'I cannot recall sanitising my hands, yet my hands smell like disinfectant;

therefore I must have sanitised my hands automatically') (Sniehotta and Presseau, 2012). The Self-Reported Behavioural Automaticity Index (SRBAI) was identified (see Chapter 5) as the conceptually most accurate measure as it is closest to current definitions of habit and automaticity (Gardner *et al.*, 2009). The measure has the added advantage that it includes only four items, which reduces the response burden on participants. However, one of the critiques of the SRBAI in its' original form is that it does not incorporate contextual cues which are essential to the understanding of habit (e.g., 'Behaviour X in Context Y is something I do automatically'; Eccles *et al.*, 2011; Sniehotta and Presseau, 2012).

One possible way to advance habit measurement could be to cross-validate self-reported measures such as the SRBAI with lab-based association tests such as tests of the strength of a person's automatic association between mental representations of objects in memory (Greenwald *et al.*, 1998). Recent advances in computing portability (e.g. using tablets and iPads) in the clinical environment might allow for more ready usage of implicit measures with healthcare professionals in ways that were not previously feasible. Such methods could also make other objective measures such as pupil dilation available by utilising the tablets' front camera (Paas *et al.*, 2003).

Qualitative methods such as interviews suffer from the same shortcomings as quantitative methods with respect to reporting habit, including participants difficulty in remembering habitual behaviours and the cues that trigger them (Gardner and Tang, 2013). One way of overcoming problems with recalling habitual behaviours/cues could be to combine self-reported habit measures with more objective video observations of healthcare professionals. This method would allow participants to form a more informed reflection about the level of automaticity of a given behaviour. This approach has already been applied in ethnographic research where video observations are used to help healthcare professionals reflect on the complexity of their clinical practice (Drew *et al.*, 2001). Another promising area of investigating habitual behaviours involves adding or removing cues that might prompt implicit goal directed behaviours. For example, the cues-of-being-watched paradigm shows that placing an image of a pair of eyes above an "honesty box" for hot drinks, can lead to a higher amount of contributions (Bateson *et al.*, 2006).

It is clear that self-reports of habit are limited, but there remains a lack of suitable alternatives to date. Overall, this thesis proposes a multi-method approach to habit measurement to overcome some of the limitations of self-reported measures that are commonly used in the implementation literature.

6.4.2 ***Theory***

The study presented in Chapter 4 showed that the positive relationship between planning and six clinical behaviours operated indirectly through habit. The study involved a secondary analysis of a large national 'improving quality in Diabetes' (iQuaD) dataset (Eccles *et al.*, 2011), which aimed to develop a comprehensive understanding of theory-based processes that underlie healthcare professional behaviour.

By integrating constructs from existing theories and delineating their underlying relationship, Chapter 4 addresses calls from the literature for the need for developing theory in a way that allows it to fit within a specific context and population and describes five ways in which theory can be extended to achieve these goals (Sniehotta *et al.*, 2015). First, theory can be extended by splitting the main concepts into sub-constructs (e.g., attitudes into affective and cognitive attitudes). Second, concepts from other theories can be added to an existing theory. Possible mediator (third way) or moderator (forth way) hypothesis can be added between existing concepts. Lastly, concepts can be integrated in other theoretical approaches.

Chapter 4 took an *integrative approach* to theory development by combining different theoretical constructs (i.e., planning and habit) and delineating their relationship in a novel way. While previous analyses showed that planning (action and coping planning) is associated with healthcare professional behaviour (Presseau *et al.*, 2013; Presseau *et al.*, 2014), it remained unclear how this relationship operated in relation to habit. The secondary analysis in Chapter 4 showed that the planning-behaviour relationship operates through habit, which was shown across 6 different behaviours (internal replication). Chapter 3 described a randomised-controlled trial which shows how the proposed theory extension could be further evaluated by integrating it as a process model alongside a randomised controlled trial. Further intervention studies are needed to substantiate the developed theoretical predictions.

It is also worth discussing how the findings in the current thesis fit with other behavioural approaches that have gained popularity in the implementation literature. One group of behavioural approaches are broad synthesising frameworks such as the Behaviour Change wheel (BCW), which offer a relatively comprehensive summary of frameworks of behaviour change interventions that allow implementation scientists to develop theory-informed interventions (Michie *et al.*, 2011). The BCW is based on a systematic search of electronic databases, which identified 19 frameworks of behaviour including intervention functions and policy categories. At the centre of the BCW is a model of behaviour (COM-B system), which assumes that there are three important components of behaviour, including *capability*, *opportunity* and *motivation*. Importantly, the COM-B model splits motivation into two sub-components, namely *reflective* and *automatic motivation*. The automatic motivational component is similar to habit and involves emotions and impulses acquired through associative learning or innate dispositions. The model does not further theorise about how automatic motivation interacts with any of the other components, however it does provide some general guidance regarding intervention functions that may target this component (e.g., persuasion, incentivisation, coercion, and training). The intervention function then links to specific strategies (i.e. behaviour change techniques) from the Behaviour Change Taxonomy (BCT; Michie *et al.*, 2013), which provides more detailed descriptions on how to intervene.

The findings in this thesis have the potential to contribute to approaches such as the BCW by delineating specific relationships between automatic motivation (i.e., habit) and other theoretical constructs (e.g., action and coping planning; See Chapter 4) and suggests ways in which these theoretical predictions can be tested beyond a correlational approach (i.e., using a intervention design; See Chapter 3). Furthermore, whereas the BCW does not provide any formal measure of automatic motivation, the current thesis provides some guidance on habit measurement (see Chapters 2, 3, 4, and 5).

6.4.3 ***Implementation science***

Within the implementation literature there is a long standing area of research which focuses on supporting healthcare professionals with behaviour change

(Bonetti *et al.*, 2006). Such approaches aim to narrow the evidence to practice gap by focusing on how to best support healthcare professionals with integrating new practices (e.g., including the use of new technologies, guidelines and/or medications) into their routines. Much of this research has adopted a theory-based approach towards clinical behaviour change which is advantageous, as it builds on existing evidence and allows a more structured approach to intervention development and evaluation. Commonly used theoretical approaches focus on understanding and targeting reflective processes that underlie healthcare professional behaviour (e.g., intention; Godin *et al.*, 2008), however there has been a call from the literature to also acknowledge the role that implicit processes (e.g., habit) play in driving clinical behaviors (Nilsen *et al.*, 2012). The current thesis addresses this call and contributes to implementation science by providing consistent evidence that habit plays an important role in driving healthcare professionals' clinical behaviours.

The finding that habit is associated with healthcare professional behaviour (see systematic review in Chapter 5) is important for several reasons. Firstly, it suggests that implementation approaches that focus on changing healthcare professionals' knowledge and beliefs only, are less likely to have a strong impact on clinical behaviours. Such approaches also need to consider the role that contextual cues play in prompting behaviours that operate automatically without much conscious awareness. Secondly, as described in a previous sections (habit measurement) measuring and changing these implicit influences on healthcare professional behaviour may necessitate a different approach, involving multiple methods (e.g., qualitative observations combined with quantitative questionnaires). Lastly, it brings to mind the question to what extent some psychological constructs (e.g., goals) that were believed to operate on a conscious level might also function on a more implicit level.

6.5 Exploring multiple goals

Although not the primary focus of this thesis, the pursuit of multiple goals influence on healthcare professional behaviour was explored. Two important constructs that are part of a multiple goals approach are goal conflict and goal facilitation. Goal conflict represents the negative influence of competing

behaviours, while goal facilitation represents the optimal use of resources that leads to synergistic relationships between behaviours. Interviews conducted with healthcare professionals who piloted the DUK IP (see Chapter 2) explicitly assessed multiple goals constructs and found that professionals readily identified goals that facilitated and others that conflicted with their use of the DUK IP. For example, one factor that was perceived as facilitating the use of the DUK IP was having a dedicated member of staff who printed them in advance to clinical consultations. These findings are consistent with other qualitative research, that has found that both healthcare professional (Presseau *et al.*, 2009) and patient population (Presseau *et al.*, 2014) samples perceived other goals to influence their pursuit of a focal behaviour. One finding in the literature relating to goal conflict is that self-reported measures do not seem to predict behaviour (Presseau *et al.*, 2010; Conner *et al.*, 2016). However, when goal conflict is measured objectively by looking at the time spent in pursuit of conflicting goal directed behaviours, a negative relationship with behaviour (i.e., physical activity) is observed. These findings are important because they suggest that people are not always aware of all the goals they pursue at any given time. More research is needed to understand whether and how automatic goal pursuit influences healthcare professional behaviour. This could involve providing feedback on video observations to healthcare professionals and asking them to what extent specific behaviours conflicted or facilitated each other. Or conversely, showing healthcare professionals how they perform behaviours that are to some extent automatic as this may help them to become more conscious and aware of how multiple goals influence each other. Such an approach is consistent with audit and feedback interventions (Ivers *et al.*, 2013) but with a specific multiple behaviour and automaticity operationalisation.

6.6 Strengths and limitations of the research

This thesis has several strengths worth noting. First, it advances the use of behavioural theory in implementation science, tackling an under researched area for which the literature has explicitly called for more consideration (Nilsen *et al.*, 2012). Namely a dual process approach was applied to better understand how implicit processes such as habit influence healthcare professional behaviour. A theory driven approach helped with utilising the existing literature on habit, whilst extending theory at the same time. For example, analyses

presented in Chapter 4 took an integrative approach to theory extension by showing that the relationship between planning (action and coping planning) and healthcare professional behaviour operated indirectly through habit.

Second, this thesis advanced methods in which action and coping planning interventions may be delivered to healthcare professionals. The trial in Chapter 3 used web-based volitional help sheets to deliver an action and coping planning intervention to healthcare professionals. This intervention was informed by a qualitative interview study (Chapter 2), which elicited healthcare professionals' views regarding barriers and facilitators to the use of the DUK IP. Even though previous research has used volitional help sheets to deliver action and coping planning interventions in general populations, the intervention developed and presented in Chapter 3 provided the first action and coping planning intervention to the authors' knowledge that has the potential to be delivered to healthcare professionals. It is also the first to authors' knowledge that was devised to be delivered online. Although, the trial failed to reach the target sample size, with an improved recruitment strategy this web-based format of intervention delivery may prove to be an acceptable, feasible and effective way of delivering an implementation intervention to support healthcare professionals with behaviour change. Further intervention development work is warranted in this regard, building on these initial findings.

Third, this thesis used multiple methods, including the use of both qualitative (i.e. theory-based interviews in Chapter 2) and quantitative methods (i.e., trial in Chapter 3, prospective study in Chapter 4, and systematic review in Chapter 5). Specifically, the triangulation of the results of each method brought about a more comprehensive understanding of how habit relates to healthcare professional behaviour. For example, the systematic review (Chapter 5) demonstrated that there are few studies that include habit as a predictor of behaviour. Indeed the studies identified so far show that there is a medium sized association between habit and clinical behaviours, which is similar in size of magnitude as the strength of associations between clinical behaviour and other predictors (e.g., intention). Furthermore, the systematic review showed that to date there is an over-reliance on self-reported measures. While Chapter 5 provided a systematic overview of the literature on habit and healthcare professional behaviour and quantified the strength of association between the

two, qualitative findings in Chapter 2 showed how specifically habit relates to behaviour. For example, healthcare professionals reported that it took them approximately one to three months to form a habit of using the DUK IP and that electronic pop-up reminders facilitated the process of habit formation.

There are a number of limitations to this thesis. Firstly, the quantitative work presented in Chapters 4 and 5 is limited to correlational evidence. As such, the conceptual framework developed and presented in Chapter 4 requires confirmation in an experimental design, such as the one developed in Chapter 3 (web-based planning intervention). By using an intervention design it would be possible to further dissect the causal mechanisms underlying planning and habit formation, which would contribute to the development of theory.

Another limitation of this thesis is that it has relied on self-reported measures of habit, which assume that a person can make an accurate reflection about the degree of automaticity of a given behaviour. Ideally, future studies should use experimental measures (e.g., reaction time measures) to tap into the cue-response facet of habit and possibly use these measures to validate existing measures (e.g., SRBAI) or develop novel ones.

A final limitation of this thesis is that it was not possible to successfully complete the intervention study reported in Chapter 3 due to problems with recruitment. Nonetheless, Chapter 3 suggests ways of overcoming problems with recruitment, such as integrating interventions in continuing professional development events. Furthermore, the intervention platform developed in Chapter 3 remains available for future intervention study. The design could be easily adapted to fit other clinical contexts and situations.

6.7 Future research

6.7.1 *Habit change strategies*

A previous section of this thesis described the potential of two behaviour change strategies (i.e., action and coping planning) for supporting habit change in healthcare professionals (implementation and de-implementation conceptualised as habit change). There are however a range of other strategies that may prove useful for supporting habit change (Lally and Gardner, 2013). A

summary of some of these strategies that have been tested in other populations and that may prove effective in healthcare professional populations follows.

Facilitating continued repetition

Once a new behaviour has been initiated it is essential that this behaviour is performed repeatedly in the presence of contextual cues for habit to form (Lally *et al.*, 2010). When designing interventions that support healthcare professionals with repeated behavioural repetition it is important to consider where these interventions are delivered. Ideally, such interventions would be delivered in the context in which the newly adopted behaviour will be performed in routine practice (e.g., in the practice), however there is also an opportunity to harness simulation studies (i.e., using simulated environments, or having trained actors visit healthcare professionals in their setting).

From a theoretical perspective such interventions could promote behavioural repetition by intervening on the quality of healthcare professionals' motivation (Ryan and Deci, 2000). *Self-Determination Theory* suggests some strategies which can facilitate continued behavioural repetition through the internalisation of external motives (Ryan and Deci, 2000). This can be achieved by addressing needs for *connection with others*, *competence* and *autonomy* (Ryan and Deci, 2000). For example, one could apply a '*lay tutor*' model, whereby healthcare professionals are supported with adopting new clinical behaviours by other professionals who are already enacting the new behaviour, which would satisfy the need for connection with others (Wilkinson *et al.*, 2011). Similarly, autonomy and competence could be promoted by using positive feedback for performing new behaviours (Ryan and Deci, 2000).

Another promising strategy to support healthcare professionals with behavioural repetition is to provide them with feedback on their behaviour. This is akin to audit and feedback whereby specific clinical behaviours are monitored and evaluative feedback on performance of the behaviour is provided (Ivers *et al.*, 2012). This process of feeding back information on behaviour may provide an opportunity to move from a habitual mode of processing to a more reflective process. Furthermore, healthcare professionals could be provided with information regarding their performance of both wanted and unwanted habits

and supported with forming effective plans (e.g., action plans) to put recommendations into action.

Increasing the speed of developing behavioural automaticity

Context dependent repetition is necessary but probably not sufficient for habit formation (Lally and Gardner, 2001). The following section discusses some strategies and factors that may influence how quickly a given behaviour may become habitual.

In principle any visible feature of the context in which a behaviour is consistently repeated can turn into a habit cue (Lally and Gardner, 2013). The qualitative findings in Chapter 2 showed that the use of electronic pop-up reminders in patients' electronic records supported healthcare professionals with forming a habit of using the DUK IP. The results also show that electronic reminders need to be used sparingly and only if they prompt a behaviour that is appropriate in the specific context. For example, healthcare professionals who were piloting the DUK IP were only prompted to use them if patients were outside a recommended range for one of the health indicators (e.g., high blood glucose levels). Interestingly, Chapter 2 showed that there are various types of cues that triggered DUK IP use, such as patient-related (e.g., person with diabetes asking for more information). Cues to behaviour can be identified using qualitative methods such as interviews and video observations and can later be used to design volitional help sheets (see Chapter 3), which support healthcare professionals with linking appropriate behaviours to them.

Breaking habitual non evidence-based behaviours

As mentioned in an earlier section, creating a new habit of providing evidence-based care often necessitates substituting an existing undesired behaviour for a more desirable alternative (Bouton, 2000). However, clinical behaviours are often performed frequently in consistent contexts, which makes them hard to change (Webb and Sheeran, 2006). One way of disrupting old habit is to discontinue exposure to habit cues (Verplanken and Melkevik, 2008). This could include removing out-dated information materials or making access to overprescribed medications more difficult.

Another strategy to break un-evidenced habit could involve the use of implementation intentions (Adriaanse *et al.*, 2011). Healthcare professionals could be asked to plan a desired action in response to a cue that used to prompt un-evidenced habit. For example, patients with upper respiratory tract infection should not be prescribed an antibiotic in the first instance. An alternative response could be to provide reassurance that antibiotics are not needed immediately.

Lastly, dual process models suggest that habit can be broken by bringing unconscious actions into conscious awareness (Deutsch and Strack, 2008). Video reflexive ethnography might be a promising strategy to make healthcare professionals aware of their un-evidenced habits (Leslie, 2014). Using this method the researcher also becomes an interventionist. It involves in-depth, round-the-clock observations, interviewing, and filming and showing selected video material to the healthcare professional for feedback.

'Choose Wisely' is an initiative in the UK that aims to advance a national dialogue on avoiding unnecessary medical tests, treatments and procedures and they offer a comprehensive online repository for these (www.choosingwisely.org). Future studies could test the effectiveness of the suggested habit change strategies in the context of some of the behaviours and procedures listed on the Choose Wisely website. For example, one recommendation by the American Academy of Nursing listed on the Choose Wisely website is not to order "formal" swallow evaluation in stroke patients unless they fail their initial swallow screen.

6.7.2 ***Novel research designs (e.g., N-of-1)***

Another area of future research involves the use of novel research designs to study habit. Within person assessments of cognitions underlying behaviour have gained popularity in health psychology (Davidson *et al.*, 2014). *N*-of-1 designs provide a method of testing predictions from behavioural theory within individuals through repeated measures over a period of time (Craig *et al.*, 2008). Such designs have successfully been applied in various settings and behaviours, including stress appraisal in nurses (Johnston *et al.*, 2016). This type of design would allow testing novel theoretical prediction from dual process models. For example, it would be possible to determine whether there are times

in the day during which habit has a larger impact on behaviours, for example during times of stress when cognitive capacities are low (Deutsch and Strack, 2008).

6.8 Conclusion

Effective healthcare professional behaviour change may require both creating and breaking habit. This thesis used a mixed-methods approach to assess predictions from dual process models in relation to healthcare professional behaviour. Findings from a systematic review and meta-analysis showed that habit is an under-researched, potentially important predictor of healthcare professional behaviour. The qualitative interview study presented in Chapter 2 showed how habit effects the adoption of a new evidence-informed intervention in type 2 diabetes care. Results from a secondary analysis (Chapter 4) provided a theoretical framework of how habit change could be achieved and this framework informed the design of an intervention to support habit formation (Chapter 3). Habit is a construct, which represents a learned tendency to perform behaviour automatically in response to cues. Although habit allows healthcare professionals to act quickly and efficiently, when clinical guidelines of best practice change as new evidence and new interventions come to light, so too must habitual behaviour. This thesis provides a foundation of evidence for further investigation into how habit relates to healthcare professional behaviour.

Appendix A. Diabetes UK Information Prescriptions

NAME: DATE:
NAME OF DOCTOR/NURSE:

DiABETES UK
CARE. CONNECT. CAMPAIGN.

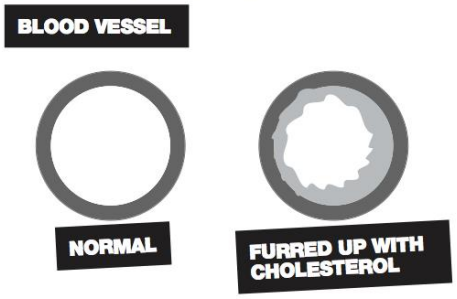
DIABETES AND BAD CHOLESTEROL
INFORMATION PRESCRIPTION

Your last cholesterol reading is: Total ☐ HDL ☐

People with diabetes and high levels of bad cholesterol are at higher risk of having a heart attack or stroke. By lowering your bad cholesterol, you can dramatically reduce your risk.

What is cholesterol?

Cholesterol is a type of fat in the blood. Sometimes it is called lipids. There is good cholesterol and bad cholesterol. HDL (high-density lipoprotein) is good cholesterol which helps protect you from heart disease. Both triglycerides and LDL (low-density lipoprotein) are bad for you.



When is cholesterol a problem?

Too much bad cholesterol in the blood causes fatty material to build up in the blood vessels supplying the brain and heart, making them narrower. This can lead to a blockage in blood vessels, which can cause a heart attack or stroke.

How can I lower my bad cholesterol?

You can make changes that lower your risk of having a heart attack or stroke.

☐ Most people need a medication to lower their bad cholesterol – the most common is a statin. These have been proven to lower cholesterol. Most people do **not** experience side-effects: if you do it is important to speak to your doctor as they can find a medication that suits you.

Keep to a healthy weight

☐ Reduce the size of your portions and cut down on fatty and sugary foods.

Eat a healthy balanced diet

☐ Eat less fatty foods, processed meats, full-fat dairy, pastries and cakes.
☐ Include wholegrains and pulses.
☐ Eat more fish, particularly oily fish – aim for at least two portions a week.
☐ Eat plenty of vegetables and fruit – aim for at least five portions a day.
☐ Replace butter, lard and ghee with vegetable oils and spreads.

Get more active

☐ Aim for 30 minutes five times a week so that you raise your heart beat. Activities such as gardening, housework and walking all count.

Stop smoking

☐ For help giving up ask for your local stop smoking service.

AGREED ACTION PLAN

My personal goal is:

To be achieved when:

The two steps that I will take to achieve this are:

(Discuss and agree with your doctor or nurse. Think about What, Where, When and How?)

1

2

For information or support, call Diabetes UK Careline: **0345 123 2399*** Mon–Fri, 9am to 7pm, or go to **www.diabetes.org.uk/info-p**

*Calls may be recorded for quality and training purposes.

NAME: DATE:
NAME OF DOCTOR/NURSE:

DiABETES UK
CARE. CONNECT. CAMPAIGN.

DIABETES AND HIGH BLOOD PRESSURE
INFORMATION PRESCRIPTION

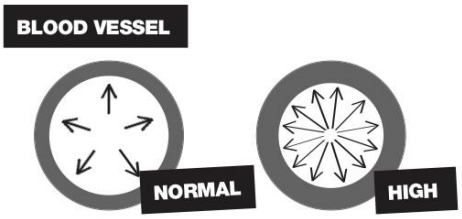
Your last blood pressure reading is ☐

People with diabetes and high blood pressure are at increased risk of having a heart attack or stroke. By lowering your blood pressure, you can dramatically reduce your risk.

Recommended target for blood pressure is lower than 130/80

What does blood pressure mean?

It is the force your heart needs to push blood around your body. The two numbers show the biggest force your heart uses to push your blood and the least pressure when your heart has relaxed.



When is high blood pressure a problem?

High blood pressure (sometimes called hypertension) is when the force used to push blood around your body is normally higher than recommended. High blood pressure puts more strain on your heart and blood vessels. If you have high blood pressure, you may feel healthy, but it is causing damage to blood vessels.

How can I lower my blood pressure?

Lifestyle changes are proven to reduce blood pressure and make you feel healthier. Most people with diabetes will need medication as well. Some people require more than one type of medicine.

☐ Your doctor will advise on the best medications for you. You will need to have your blood pressure checked to see how well it is working. Most people do **not** experience side effects: if you do it is important to tell your doctor.

Keep to a healthy weight

- ☐ Reduce the size of your portions.
- ☐ Cut down on fatty and sugary foods.

Eat a healthy balanced diet

- ☐ Reduce salt: eat less fast food; choose low-salt options; and do not add salt.
- ☐ If you drink, cut down on alcohol.
- ☐ Eat plenty of vegetables and fruit – aim for at least five portions a day.
- ☐ Eat less fatty foods, processed meats, full-fat dairy, pastries and cakes.
- ☐ Eat more fish, particularly oily fish – aim for at least two portions a week.

Get more active

- ☐ Aim for 30 minutes five times a week so that you raise your heart beat. Activities such as gardening, housework and walking all count.

Stop smoking

- ☐ For help giving up ask for your local stop smoking service.

AGREED ACTION PLAN

My personal goal is:

To be achieved when:

The two steps that I will take to achieve this are:

(Discuss and agree with your doctor or nurse. Think about What, Where, When and How?)

1

2

For information or support, call Diabetes UK Careline: **0345 123 2399*** Mon–Fri, 9am to 7pm, or go to **www.diabetes.org.uk/info-p**

*Calls may be recorded for quality and training purposes.

NAME: DATE:
NAME OF DOCTOR/NURSE:

DiABETES UK
CARE. CONNECT. CAMPAIGN.

DIABETES AND HIGH HbA1c
INFORMATION PRESCRIPTION

Your last two HbA1c results are ..../..../.... ☐ ..../..../.... ☐

Good glucose control is important to reduce your risk of devastating complications. Reducing HbA1c has been proven to have health benefits. Discuss and agree with your doctor or nurse a realistic personal target for HbA1c ☐

What is HbA1c?

It tells you your average blood glucose for the last two to three months. We all need glucose for energy, but if you have diabetes your body loses its ability to use glucose. HbA1c measures how much glucose is stuck to your red blood cells. A finger-prick test shows you a snap-shot of your glucose at a moment in time, whereas HbA1c acts like a film recording how your glucose levels have changed.

When is high HbA1c a problem?

High levels of blood glucose over a long period of time can damage the blood vessels. This puts you at higher risk of going blind, losing a limb or experiencing kidney failure.

How can I lower my HbA1c?

It is important to understand that your HbA1c will change for many reasons including: how long you have had diabetes, sickness, depression, change in lifestyle or because of other medicine such as steroids. The actions you take to reduce your HbA1c will depend on whether you have Type 1 or Type 2 diabetes and your overall health. There are three main areas to be considered:

1 **Medication:** It may be time to increase your dose or introduce new medication – ask for advice.
2 **Education:** Your healthcare team are there to provide support, but *you* manage *your* diabetes. Education can help you understand what affects your blood glucose. Ask what is on offer in your area.
3 **Lifestyle:** Discuss what changes can lower HbA1c:

Keep to a healthy weight

☐ Reduce the size of your portions and cut down on fatty and sugary foods.

Eat a healthy balanced diet

☐ Eat less fatty food, processed meats, full-fat dairy, pastries and cakes.
☐ Be aware of how carbohydrate changes your blood glucose – you may need to eat less carbohydrate and choose wholegrains.
☐ If you drink, cut down on alcohol.
☐ Eat plenty of vegetables and fruit – aim for at least five portions a day.
☐ Eat more fish, particularly oily fish – aim for at least two portions a week.

Get more active

☐ Aim for 30 minutes five times a week so that you raise your heart beat. Activities such as gardening, housework and walking all count.

Stop smoking

☐ For help giving up ask for your local stop smoking service.

AGREED ACTION PLAN

My personal goal is:

To be achieved when:

The two steps that I will take to achieve this are:

(Discuss and agree with your doctor or nurse. Think about What, Where, When and How?)

1

2

For information or support, call Diabetes UK Careline: **0345 123 2399*** Mon–Fri, 9am to 7pm, or go to **www.diabetes.org.uk/info-p**

*Calls may be recorded for quality and training purposes.

Appendix B. University ethical approval

23/02/15
Sebastian Potthoff
Health Foundation Doctoral Research Fellow,
Institute of Health and Society

Faculty of Medical Sciences
Newcastle University
The Medical School
Framlington Place
Newcastle upon Tyne
NE2 4HH United Kingdom

FACULTY OF MEDICAL SCIENCES: ETHICS COMMITTEE

Dear Sebastian,

Title: Implementation intentions for creating and breaking habits in care provided to patients with type 2 diabetes: a dual process approach.
Application No: 00849
Start date to end date: 29/01/15 to 17/02/2017

On behalf of the Faculty of Medical Sciences Ethics Committee, I am writing to confirm that the ethical aspects of your proposal have been considered and your study has been given ethical approval.

The approval is limited to this project: **00849 /2015**. If you wish for a further approval to extend this project, please submit a re-application to the FMS Ethics Committee and this will be considered.

During the course of your research project you may find it necessary to revise your protocol. Substantial changes in methodology, or changes that impact on the interface between the researcher and the participants must be considered by the FMS Ethics Committee, prior to implementation.*

At the close of your research project, please report any adverse events that have occurred and the actions that were taken to the FMS Ethics Committee.*

Best wishes,

Yours sincerely

Kimberley Sutherland
On behalf of Faculty Ethics Committee

cc.
Professor Daniel Nettle, Chair of FMS Ethics Committee
Ms Lois Neal, Assistant Registrar (Research Strategy)

*Please refer to the latest guidance available on the internal Newcastle web-site.

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2009

Appendix C. Research and development approval

North of England
Commissioning Support Unit
2nd Floor
Riverside House
Goldcrest Way
Newburn Riverside
Newcastle upon Tyne
NE15 8NY

Tel: (0191) 217 2586
E-mail: NECSU.researchanddevelopment@nhs.net

22nd January 2015

Mr Sebastian Potthoff
The Baddiley Clark
Building
University of Newcastle
Richardson Road
Newcastle upon Tyne
NE2 4AX

Dear Mr Potthoff

Study Title: Evaluating an "information prescription" for type 2 diabetes

Thank you for submitting your application which has been reviewed by the North of England Commissioning Support Unit. We provide research assurance to Primary Care Providers in Northumberland Tyne and Wear, County Durham & Tees Valley and North Cumbria to assist them in deciding whether to participate in research studies. Please provide this letter to Primary Care Providers when confirming that they are willing to participate in a study.

I am pleased to confirm this application has completed the governance process for **Research Sites in:**

NHS Newcastle North and East CCG
NHS Newcastle West CCG
NHS North Tyneside CCG
NHS Northumberland CCG
NHS South Tyneside CCG
NHS Sunderland CCG
NHS Gateshead CCG
NHS Darlington CCG
NHS Hartlepool and Stockton on Tees CCG
NHS South Tees CCG
NHS Durham Dales, Easington and Sedgefield CCG
NHS North Durham CCG
NHS Cumbria CCG

Our assurance is issued on the basis that the research study is conducted in accordance with the version of the protocol and supporting documents submitted with your application. All amendments need to be submitted in accordance with

the guidance in IRAS and our assurance will continue following submission of amendments unless we notify you otherwise. The sponsor is responsible for ensuring systems are in place for notifying Primary Care Providers of any amendments and providing amended documentation to site staff.

NB: This letter does not place any obligations on Primary Care Providers to participate in the research.

If you do require advice in relation to the conduct of the research at the above sites/PICs please contact **the NECS R&D Office.** We also welcome feedback about your experience of this review process to help us improve our systems.

May I take this opportunity to wish you well with your research. We look forward to hearing the progress and outcomes for the study.

Yours sincerely

Shona A Haining

Shona A Haining BSc PhD
Senior R&D Manager
North of England Commissioning Support

Copy: Justin Presseau, Newcastle University, Justin.presseau@ncl.ac.uk
Lois Neal, Newcastle University, lois.neal@ncl.ac.uk

Appendix D. Theory-informed interview topic guide

Introduction

1. Introduce researcher and purpose of the study
2. Obtain consent to proceed and to record the conversation
3. Remind interviewee that all information remains confidential, and that they are free to stop the interview and withdraw at any time.

Demographics

- What is your job title?
- How many years of experience do you have?
    - How many years working with people with type 2 diabetes?

Theory domain questions

Behaviour

- Since starting to use the info prescriptions, how many patients a week have you seen?
    - And of those, how many did you use the info prescription with?

Outcome expectancy

- How useful has the information prescription been for improving the interaction between you and your patients?
    - In what ways has it been useful?
- Can you talk to me a bit about how you think this tool might help your patients improve their HbAc1 levels, blood pressure, and cholesterol levels? (might be difficult)

Intention

- How motivated are you to use the information prescription?
- When are you most motivated?
    - Keep prompting for examples (e.g. when prompted by patient, when reminded by the computer, when enough time)
- When are you least motivated?
    - E.g. when stressed, when patient appears to know about self-management

Action planning

- Do you have a specific plan for when, where and how you will be using the information prescription during your consultation?
    - If so how did you plan the way you are using the information prescription?

Self-efficacy

- Did anything make it difficult or impossible to use the information prescription (barrier)?
    - If so what? (have prompts ready in case they aren't sure)
    - E.g. Discussing weight management is a sensitive topic, patient doesn't believe in lifestyle changes, the ink of the printer is running low, running low in time
- How confident are you that you would still be able to make use of the information prescription even if those barriers come up?
- Did anything make it easier to use the information prescription? If so what?
    - E.g. patient asking about self-management advise, printing them out before an appointment

Coping planning

- When you encountered any barriers (come up with some examples) did you have a plan in place on how to deal with the barriers so that you could still make use of the information prescription despite the barriers?

Automaticity

- What triggered you to use the information prescription (If not clear, ask what made you think of using it in the consultation? Something you did? Something the patient said? Prompt on the screen? Having them on the desk?). Did you only ever use it when trigger occurred or other times too?
- Do you see the use of the information prescription as part of your regular routine yet? If so, what supported that? If not, what might help it to become more routinely used?
- How long do you think it will take to build this into your routine? What would it take for you to use it without having to remember?

Competing demands

- I imagine you have been delivering this type of advice in the past in different ways. What kind of ways have you previously used/are you using to convey the same information (e.g. HbAC1 levels, high blood pressure, and high cholesterol levels)?
- How does the new information prescription compare to alternative methods? Has the information prescription replaced your other methods? If not, why?

Final section

- Do you have any other thoughts or suggestions?
- The information prescription will be rolled out and installed on all the computer systems in early autumn. Do you have any advice about how this can be done in the most helpful way?

End of Interview

Thank respondent for their time and switch off recorder.

Appendix E. Coding tree based on theory-based process model

a. **Reflective process**
    i. Behaviour
    ii. Outcome expectancy—*The HCPs estimate of whether the usage of the information prescriptions will lead to a certain outcome.*
        1. Improve interaction
        2. Improve patient outcomes
    iii. Intention—*An indication of the HCPs readiness (or motivation) to use the information prescriptions. It is assumed to be an immediate antecedent of behaviour.*
        1. Most motivated
        2. Least motivated
    iv. Action planning—*The extent to which HCPs have a specific plan when, where and how to use the information prescriptions.*
    v. Self-efficacy—*The HCPs' perceived capability to use the information prescriptions, even in the face of potential barriers*
        1. Barriers
        2. Facilitators
    vi. Coping planning—*The extent to which a HCP has a plan of how to deal with barriers to the usage of the information prescriptions.*
b. **Impulsive process**
    i. Automaticity—*The extent to which the usage of the information prescriptions has become a habit or routine.*
        1. Contextual cues—*Cues or prompts that remind the HCP to use the information prescriptions (e.g. pop-up, something the patient says, or having a stack of printed information prescriptions on the desk)*
        2. Habit formation
c. **Multiple behaviour process**
    i. Competing demands—*Alternative methods of delivering similar advice (e.g. leaflet by The British Heart Foundation) and that might compete with the usage of the information prescription.*

Appendix F. Diabetes UK newsletter

DIABETES UK
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PRIMARY CARE NETWORK

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Dear Mrs Rylance,

Welcome to the April 2015 issue of Primary Care Network E-news. We have just returned from the Diabetes UK Professional Conference, where the theme was Diabetes: Time to Take Control. This issue will feature news from the conference and stories from some of the key abstracts presented there.

Best wishes,
Beth Stout

Healthcare Professional Groups Coordinator
Diabetes UK

'New approach needed' to tackle inpatient diabetes care

The UK's leading specialist in diabetes inpatient care has advised that a new approach is needed to tackle the often poor care that people with diabetes receive in hospital, and to address the almost 8-10% higher mortality rate among inpatients with diabetes. At the Diabetes UK Professional Conference, Dr Gerry Rayman said that hospital management teams and diabetes specialist teams must work together to implement hospital-wide safety practices.

NEWS

How do you use information prescriptions?
We want to know about the effect of information prescribing on professional behaviour. Tell us what you think about Diabetes UK's information prescriptions.

Changes to NDA core audit data collection
Two years' worth of data will be collected in the next 5 months, and there has been a move to an opt-in system for data collection. Find out how your practice will be affected.

TYPE2 TOGETHER

New peer support service for people with Type 2 diabetes
Type 2 Together gives people a chance to share experiences and tips to live well. Help us to promote the service to your patients.

ADVANCED DIABETES FOR PRIMARY CARE

New Advanced Diabetes for Primary Care training
Diabetes UK are offering advanced training for GPs and practice nurses, to increase their knowledge about key diabetes issues.

Do your patients have a medical exemption certificate?
Diabetes UK have secured refunds for those who have been fined, but everyone with diabetes still needs a certificate.

Compassionate care and Type 2 diabetes: what do you think?
Take part in a research study exploring the concept of compassionate care from the perspective of healthcare professionals.

HORIZON SCANNING

Discriminating between Type 1 and Type 2 diabetes
As rising obesity rates make it difficult to discriminate between Type 1 and Type 2 diabetes in young adults, find out how a simple test can help.

Chronic liver disease in older people with Type 2 diabetes
This abstract looks at the prevalence and incidence of significant chronic liver disease in older people with Type 2 diabetes.

Appendix G. Web-based survey platform

A quick survey about your use of Diabetes UK information prescriptions

You may have recently seen on the **BBC** (http://www.bbc.co.uk/news/health-30979414) that Diabetes UK has developed and released a series of new information prescriptions (available on practice computer systems) with which clinicians and patients can make decisions together about the treatment and self-management of three topics: **glycaemic control, hypertension and cholesterol.**

We are interested in your views on the information prescriptions

Who should complete this questionnaire?
Any GPs, nurses, or healthcare assistants that have used the Diabetes UK information prescriptions at least once.

What is the survey for?
We want to assess how these info prescriptions are being used in relation to other alternative methods of providing self-management advice.

How long will it take?
Our piloting shows that it will take **less than 15 minutes.**

Prize draw
To get the most out of this study, we would like to contact you in three and six months' time to complete another very short questionnaire. **Anyone completing all three questionnaires** and **providing their email address** below will be **entered into a raffle for a new Apple iPad Mini** (http://store.apple.com/uk/buy-ipad/ipad-mini-2/16gb-space-grey-wifi)

Please enter your **email address** below:

Your answers will be treated confidentially and combined with answers from other participants so that no individual responses will be recognisable in any analysis or resulting publications.

If you have any questions, please contact Sebastian Potthoff (sebastian.potthoff@ncl.ac.uk)

If you agree to participate in this study, please indicate so below, which will be taken as consent

□ I agree to participate in this study

Page 1)

Page 2) Background

Q1. [Gender] Are you …
[Male/Female]

Q2. [Year qualified] In what year did you qualify?
[Year]

Q3. Are you a GP trainer in a vocational training scheme?
[Yes/No]

Q4. How many sessions a week do you work?
[n (½ day) Sessions]

Q5. What is your role within your General Practice?
[Practice nurse]
[Nurse Specialist (Specialty)]
[Nurse Practitioner]
[Nurse Prescriber]
[District Nurse]
[GP (Salaried)]
[GP (Partner)]
[Other (please specify)]

Q6. Within YOUR role do you consider yourself to be involved in the routine delivery of care to patients with type 2 diabetes in any way?
[Yes/No]

Page 2)

The following questions focus on how **YOU use the Diabetes UK information prescriptions** in the clinical management over **the next 3 months** of your **patients with type 2 diabetes *who are above target.***

Please indicate how much you **agree/disagree** with the following statements by **selecting one number**. Some questions might appear similar; this is deliberate. It is important for the study that you ***answer all the questions if you can. Please think of your patients with type 2 diabetes who are above target when answering the following questions***

If I use the Diabetes UK info prescriptions, then it will…

	Strongly disagree	*Disagree*	*Disagree somewhat*	*Neither agree nor disagree*	*Agree somewhat*	*Agree*	*Strongly agree*
…**Help** me **support** my patients in self-managing their diabetes	*1*	*2*	*3*	*4*	*5*	*6*	*7*
…It will have a **positive influence** on my practice	*1*	*2*	*3*	*4*	*5*	*6*	*7*
…Make my **consultations easier**	*1*	*2*	*3*	*4*	*5*	*6*	*7*

I am confident that I can use the info prescriptions, even when…

	Strongly disagree	*Disagree*	*Disagree somewhat*	*Neither agree nor disagree*	*Agree somewhat*	*Agree*	*Strongly agree*
…I have **limited time**	*1*	*2*	*3*	*4*	*5*	*6*	*7*
…The clinic is busy and **I am running 20 minutes late**	*1*	*2*	*3*	*4*	*5*	*6*	*7*
…My patient's **first language is not English**	*1*	*2*	*3*	*4*	*5*	*6*	*7*
…I have **given lifestyle advice** to this patient in the **past**	*1*	*2*	*3*	*4*	*5*	*6*	*7*

I intend to use the info prescriptions with my patients with type 2 diabetes who are above target within the next 3 months…

Strongly disagree	*Disagree*	*Disagree somewhat*	*Neither agree nor disagree*	*Agree somewhat*	*Agree*	*Strongly agree*
1	*2*	*3*	*4*	*5*	*6*	*7*

I intend to use other means of providing self-management advice to my patients with type 2 diabetes within the next 3 months…

Strongly disagree	*Disagree*	*Disagree somewhat*	*Neither agree nor disagree*	*Agree somewhat*	*Agree*	*Strongly agree*
1	*2*	*3*	*4*	*5*	*6*	*7*

In what other ways have you been providing self-management advice is the past (e.g. NHS choice website, British Heart Foundation leaflets, or personal expertise)?

Please specify:

Page 3)

The following questions focus on how **YOU use the Diabetes UK information prescriptions** in the clinical management over **the next 3 months** of your **patients with type 2 diabetes *who are above target*.**

Using the info prescriptions with my type 2 diabetes patients who are above target is something…

	Strongly disagree	*Disagree*	*Disagree somewhat*	*Neither agree nor disagree*	*Agree somewhat*	*Agree*	*Strongly agree*
…I do **automatically**	*1*	*2*	*3*	*4*	*5*	*6*	*7*
…I do **without having to consciously remember**	*1*	*2*	*3*	*4*	*5*	*6*	*7*
…I do **without thinking**	*1*	*2*	*3*	*4*	*5*	*6*	*7*
…I **start doing before I realise I'm doing it**	*1*	*2*	*3*	*4*	*5*	*6*	*7*

Think about the range of activities you do **during diabetes consultations** when answering the following three questions

Other activities I do during a typical diabetes consultation…

	Strongly disagree	*Disagree*	*Disagree somewhat*	*Neither agree nor disagree*	*Agree somewhat*	*Agree*	*Strongly agree*
…**help me** to use the info prescriptions	*1*	*2*	*3*	*4*	*5*	*6*	*7*
…lead me to spend **less time** using the info prescriptions	*1*	*2*	*3*	*4*	*5*	*6*	*7*
…have **higher priority** than using the info prescriptions	*1*	*2*	*3*	*4*	*5*	*6*	*7*

Page 4)

The following questions focus on how **YOU use the Diabetes UK information prescriptions** in the clinical management over **the next 3 months** of your **patients with type 2 diabetes *who are above target.***

I have a clear plan of…

	Strongly disagree	*Disagree*	*Disagree somewhat*	*Neither agree nor disagree*	*Agree somewhat*	*Agree*	*Strongly agree*
…how to bring up the info prescriptions **during the consultation**	*1*	*2*	*3*	*4*	*5*	*6*	*7*
…when during the **year** I will use the info prescriptions	*1*	*2*	*3*	*4*	*5*	*6*	*7*
…when during the consultation I will use the info prescriptions	*1*	*2*	*3*	*4*	*5*	*6*	*7*

I have **made a clear plan** regarding using the info prescriptions, **even if**…

	Strongly disagree	*Disagree*	*Disagree somewhat*	*Neither agree nor disagree*	*Agree somewhat*	*Agree*	*Strongly agree*
…I have **limited time**	*1*	*2*	*3*	*4*	*5*	*6*	*7*
…the clinic is busy and **I am running 20 minutes late**	*1*	*2*	*3*	*4*	*5*	*6*	*7*
…my patient's **first language is not English**	*1*	*2*	*3*	*4*	*5*	*6*	*7*
…I have **given lifestyle advice** to this patient in the **past**	*1*	*2*	*3*	*4*	*5*	*6*	*7*

Page 5)

The following questions focus on how **YOU use the Diabetes UK information prescriptions** in the clinical management over **the next 3 months** of your **patients with type 2 diabetes *who are above target.***

Think of the ***past*** **three months**.

With how many of your ***last*** **10 patients** with type 2 diabetes did you **make to use of the info prescriptions?**

0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*

Think of the ***past*** **three months**.

For how many of your ***last*** **10 patients** with type 2 diabetes did you use other means of **providing self-management advice?**

0	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*

Page 6)

The following questions focus on how **YOU use the Diabetes UK information prescriptions** in the clinical management over **the next 3 months** of your **patients with type 2 diabetes *who are above target.***

Programming your mind to remember: Research shows that making a specific plan linking **'where and when you will do a new behaviour'** to **'how you will do a new behaviour'** increases the chances that you will do it.

Step 1: Identify a good opportunity in which you will use the info prescriptions

Step 2: Link the opportunity that best suits **how you will use the info prescriptions.** There are no right or wrong answers.

Link up to three opportunities with a suitable response **by dragging and dropping it into the box**.

Opportunities to use the info prescriptions	**Ways of using the info prescriptions**
IF my patient's *blood pressure* is *elevated…*	**THEN I WILL** use an info prescription to explain what high blood pressure means
IF my patient's *cholesterol* is *elevated…*	**THEN I WILL** use an info prescription *to explain what high cholesterol means*
IF my patient's *HbA1c* is *elevated…*	**THEN I WILL** use an info prescription to *explain what high HbA1c means*
IF my patient is in for their *annual review*	**THEN I WILL** use an info prescription to *help my patient set personal behavioural goals that work for them*
IF my patient asks me *how to keep a healthy diet*	**THEN I WILL** use an info prescription to explain *how to eat more healthily*
IF my patient asks me *how to become more physically active*	**THEN I WILL** use an info prescription to *provide examples of physical activity*

Page 7)

The following questions focus on how **YOU use the Diabetes UK information prescriptions** (http://www.bbc.co.uk/news/health-30979414) in the clinical management over **the next 3 months** of your **patients with type 2 diabetes *who are above target.***

Even the best plans can get derailed by things that get in the way. **Planning in advance how you will deal with barriers to using the info prescriptions can help you** to ensure you make best use of them. Please take a few moments to:

- Identify at up to three barriers you may face

- Link them with the appropriate solutions by dragging and dropping them into the box. There are no right or wrong answers.

Potential barrier to my using Diabetes UK info prescriptions	**My solutions**
IF I have limited time…	**THEN I WILL** ask a colleague to complete a info prescription with the patient
IF the clinic is busy and I am *running 20 minutes* late…	**THEN I WILL** give the patient a copy of the prescription to take home and read in their own time
IF my patient's *first language is not English…*	**THEN I WILL** ask a friend or family member to translate the info prescription for the patient
IF I *have given lifestyle advice to this patient in the past*	**THEN I WILL** use an info prescription to provide self-management advise that is tailored to my patient's needs
IF I *do not have a good relationship* yet with the patient	**THEN I WILL** use the info prescription as a vehicle for building a relationship with my patient
IF I have a full waiting room…	**THEN I WILL** make sure that printed copies of the info prescriptions are available in the waiting room

Thank you! You have now completed your questionnaire!

Appendix H. iQuaD baseline questionnaire

Confidential | | | | | | / 1.4

Institute of Health&Society

Diabetes UK

Improving the delivery of care for patients with type 2 diabetes

Thank you very much for participating in this project.

This questionnaire has **THREE** sections.

SECTION 1: contains questions that should be answered by **all GPs and Nurses in your practice.** It should take you approximately **10 – 15 minutes** to complete this section.

SECTION 2: contains additional clinical management questions for **GPs and those Nurses** in your practice **who consider themselves to be involved in the delivery of care to patients with type 2 diabetes**

SECTION 3: contains a number of patient scenarios and should be also be completed by **GPs and those Nurses** in your practice **who consider themselves to be involved in the delivery of care to patients with type 2 diabetes.**

It should take you between **1 and 1.5 hours** to complete sections 2 and 3.

All responses to this questionnaire will be strictly confidential.

Newcastle University

Newcastle NHS Primary Care Trust

Background

Are you …? ☐ **Male** ☐ **Female**

In what year did you qualify? ☐☐☐☐

Are you a GP trainer in a vocational training scheme ☐ **Yes** ☐ **No**

How many sessions a week do you work? ☐☐ **Sessions**
(1 session = ½ day)

For the purposes of this study we are referring to all the staff working in your General Practice (both clinical and non-clinical) as being members of a "*Primary Care Team*".

What is your role within your General Practice? (Please circle)

Practice nurse | Nurse Specialist (Specialty:) | Nurse Practitioner

Nurse Prescriber | District Nurse | GP (Salaried) | GP (Partner)

Other (please specify)

Within *YOUR* role, do you consider yourself to be involved in the routine delivery of care to patients with Type 2 diabetes in any way? (Please tick below)

☐ ***YES* -*** *If **YES**, What kind of care do you provide?* .....
.....
.....
.....
.....

- *Please now complete **ALL THREE SECTIONS** of this questionnaire.

☐ ***NO -*** please complete **questions 1 to 10** in **Section One** of this questionnaire (pages 3 to 6), then GO TO page 44.

If you have any queries about the study or this questionnaire, you can find our contact details on the back cover.

SECTION ONE: *Questions about your primary care team*

Please consider your answers to the following questions in relation to how your primary care team works ***in general.***

Generally, in this practice …	***Strongly disagree***						***Strongly agree***
We have a 'We are in it together' attitude	1	2	3	4	5	6	7
People keep each other informed about work-related issues in the primary care team	1	2	3	4	5	6	7
People feel understood and accepted by each other	1	2	3	4	5	6	7
There are real attempts to share information throughout the team	1	2	3	4	5	6	7
People in this team are always searching for fresh, new ways of looking at problems	1	2	3	4	5	6	7
We take the time needed to develop new ideas	1	2	3	4	5	6	7
People in the team co-operate in order to help develop and apply new ideas	1	2	3	4	5	6	7

Generally, in this practice …	***Not At All***						***Completely***
How far are you in agreement with your team's objectives?	1	2	3	4	5	6	7
To what extent do you think your team's objectives are clearly understood by other members of the team?	1	2	3	4	5	6	7
To what extent do you think your team's objectives can actually be achieved?	1	2	3	4	5	6	7
How worthwhile do you think these objectives are to the team?	1	2	3	4	5	6	7

Generally, in this practice …	***To a very little extent***						***To a very great extent***
Are team members prepared to question the basis of what the team is doing?	1	2	3	4	5	6	7
Does the team critically appraise potential weaknesses in what it is doing in order to achieve the best possible outcome?	1	2	3	4	5	6	7
Do members of the team build on each other's ideas in order to achieve the best possible outcome?	1	2	3	4	5	6	7

Within your General Practice …	***Strongly disagree***						***Strongly agree***
Procedures are designed to collect accurate information necessary for making decisions	1	2	3	4	5	6	7
Procedures are designed to provide opportunities to appeal or challenge the decision	1	2	3	4	5	6	7
Procedures are designed to have all sides affected by the decision represented.	1	2	3	4	5	6	7
Procedures are designed to generate standards so that decisions could be made with consistency.	1	2	3	4	5	6	7
Procedures are designed to hear the concerns of all those affected by the decision	1	2	3	4	5	6	7
Procedures provide useful feedback regarding the decision and its implementation.	1	2	3	4	5	6	7
Procedures are designed to allow for requests for clarification or additional information about the decision	1	2	3	4	5	6	7

In this General Practice …	***Strongly disagree***						***Strongly agree***
Primary care team members consider your viewpoint.	1	2	3	4	5	6	7
Primary care team members are able to suppress personal biases.	1	2	3	4	5	6	7
Primary care team members provide you with timely feedback about a decision and its implications.	1	2	3	4	5	6	7
Primary care team members treat you with kindness and consideration.	1	2	3	4	5	6	7
Primary care team members show concern for your rights as a clinician.	1	2	3	4	5	6	7
Primary care team members take steps to deal with you in a truthful manner.	1	2	3	4	5	6	7
Primary care team members consider your viewpoint.	1	2	3	4	5	6	7

Within my primary care team, team members …	***Strongly disagree***						***Strongly agree***
Help each other out if someone falls behind in his/her work.	1	2	3	4	5	6	7
Are willing to share their expertise with other members of the team	1	2	3	4	5	6	7
Try to act as peacemakers when other team members have disagreements	1	2	3	4	5	6	7
Take steps to try prevent problems with other team members	1	2	3	4	5	6	7
Are willing give their time to help team members who have work related problems	1	2	3	4	5	6	7
"Touch base" with other team members before initiating actions that may affect them	1	2	3	4	5	6	7
Encourage each other when someone is down	1	2	3	4	5	6	7
Provide constructive suggestions about how the team can improve in effectiveness	1	2	3	4	5	6	7
Are willing to risk disapproval to express their beliefs about what is best for the team	1	2	3	4	5	6	7
Attend and actively participate in team meetings	1	2	3	4	5	6	7
Always focus on what is wrong with our situation, rather than the positive side	1	2	3	4	5	6	7
Consume a lot of time complaining about trivial matters	1	2	3	4	5	6	7
Always find faults with what other team members are doing	1	2	3	4	5	6	7

Generally ...	***Strongly disagree***						***Strongly agree***
My job allows me to make a lot of decisions on my own	1	2	3	4	5	6	7
I have a lot of say about what happens in my job	1	2	3	4	5	6	7
In my job, I have very little freedom to decide how I do my work	1	2	3	4	5	6	7
My job requires me to be creative	1	2	3	4	5	6	7
My job involves a lot of repetitive tasks	1	2	3	4	5	6	7
My job requires a high level of knowledge and skills	1	2	3	4	5	6	7
My job requires that I learn new things	1	2	3	4	5	6	7
I get to do a variety of different clinical tasks in my job	1	2	3	4	5	6	7
I have an opportunity to develop my own special abilities	1	2	3	4	5	6	7
My job requires working very fast	1	2	3	4	5	6	7
My job requires working very hard	1	2	3	4	5	6	7
I have to do an excessive amount of work	1	2	3	4	5	6	7
I have enough time to get the job done	1	2	3	4	5	6	7

Which primary care team members in your general practice are mainly involved in providing care for patients with diabetes?

Name	**Position** (GP, Nurse, receptionist etc)
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The next questions are about you and are a little more personal. Please be re-assured that your responses to all questions are **completely confidential** and will not be disclosed to any other member of your primary care team.

Have you recently …	***Much less than usual***	***Same as usual***	***More than usual***	***Much more than usual***
Been able to concentrate on whatever you're doing?	1	2	3	4
Lost much sleep over worry?	1	2	3	4
Felt that you are playing a useful part in things?	1	2	3	4
Felt capable of making decisions about things?	1	2	3	4
Felt constantly under strain?	1	2	3	4
Felt you couldn't overcome your difficulties?	1	2	3	4
Been able to enjoy your normal day-to-day activities?	1	2	3	4
Been able to face up to your problems?	1	2	3	4
Been feeling unhappy and depressed?	1	2	3	4
Been losing confidence in yourself?	1	2	3	4
Been thinking of yourself as a worthless person?	1	2	3	4
Been feeling reasonably happy, all things considered?	1	2	3	4

Over the PAST 12months

How many ***episodes*** of sickness/illness have you had that resulted in you being absent from work? Number of episodes

How many ***days in total*** were you absent from work due to sickness/illness? Total number of days absent

Over the NEXT 12months:

Do you have any plans to leave your current position/move to new position? **Yes** **No**

If Yes – it would be helpful to us to know your reason for leaving

Thank you for completing the first 10 questions in SECTION 1.

If you **DO NOT** consider yourself to be **involved in the routine delivery of care** to patients with diabetes - **please now go to page 44** where you will find details of how to return this questionnaire to us, and space for you to make comments on the study.

If you **DO** consider yourself to be **involved in the routine delivery of care** to patients with diabetes, **please now CONTINUE to the next page (page 7),** and complete **the additional questions in Section 1.** You should then continue through the questionnaire to **complete SECTIONS 2 and 3.**

You will find that the following questions are the same or very similar to some of those we asked you earlier in Section 1.

This is because we would now like you to consider your answers to these questions ***in relation to how your primary care team works in the management of diabetes.***

In relation to the management of diabetes …	***Strongly disagree***						***Strongly agree***
We have a 'we are in it together' attitude	1	2	3	4	5	6	7
People keep each other informed about work-related issues in the primary care team	1	2	3	4	5	6	7
People feel understood and accepted by each other	1	2	3	4	5	6	7
There are real attempts to share information about the management of diabetes throughout the team	1	2	3	4	5	6	7
People in this team are always searching for fresh, new ways of looking at problems relating to the management of patients with diabetes	1	2	3	4	5	6	7
We take the time needed, in this team, to develop new ideas about how to manage patients with diabetes	1	2	3	4	5	6	7
People in the team co-operate in order to help develop and apply new ideas to the management of diabetes	1	2	3	4	5	6	7

In relation to the management of diabetes …	***Not At All***						***Completely***
How far are you in agreement with your team's objectives?	1	2	3	4	5	6	7
To what extent do you think your team's objectives are clearly understood by other members of the team?	1	2	3	4	5	6	7
To what extent do you think your team's objectives can actually be achieved?	1	2	3	4	5	6	7
How worthwhile do you think these objectives are to the team?	1	2	3	4	5	6	7

In relation to the management of diabetes …	***To a very little extent***						***To a very great extent***
Are team members prepared to question the basis of what the team is doing?	1	2	3	4	5	6	7
Does the team critically appraise potential weaknesses in what it is doing in order to achieve the best possible care for patients?	1	2	3	4	5	6	7
Do members of the team build on each other's ideas in order to achieve the best possible care?	1	2	3	4	5	6	7

In relation to the management of diabetes …	***Strongly disagree***						***Strongly agree***
My job allows me to make a lot of decisions on my own	1	2	3	4	5	6	7
I have a lot of say about what happens in my job	1	2	3	4	5	6	7
In my job, I have very little freedom to decide how I do my work	1	2	3	4	5	6	7
My job requires me to be creative	1	2	3	4	5	6	7
My job involves a lot of repetitive tasks	1	2	3	4	5	6	7
My job requires a high level of knowledge and skills	1	2	3	4	5	6	7
My job requires that I learn new things	1	2	3	4	5	6	7
I get to do a variety of different clinical tasks in my job	1	2	3	4	5	6	7
I have an opportunity to develop my own special abilities	1	2	3	4	5	6	7
My job requires working very fast	1	2	3	4	5	6	7
My job requires working very hard	1	2	3	4	5	6	7
I have to do an excessive amount of work	1	2	3	4	5	6	7
I have enough time to get the job done	1	2	3	4	5	6	7

Thank you! You have now completed the first section of the questionnaire. 

Please now continue to SECTION TWO on the next page.

SECTION 2

Questions about YOUR clinical management of patients with Type 2 diabetes

PLEASE READ THE GUIDANCE AND NOTES BELOW VERY CAREFULLY BEFORE COMPLETING THIS SECTION OF THIS QUESTIONNAIRE

Section 2 contains questions asking about **YOUR clinical management** of six different aspects of care delivery for patients with **type 2 diabetes:**	
1. Giving advice about weight management	2. Prescribing additional antihypertensive drugs
3. Examining foot circulation & sensation	4. Providing advice about self-management
5. Prescribing additional therapy for the management of glycaemic control (HbA1c)	6. Providing general education about diabetes

Some of the six aspects of care covered in this questionnaire may not be a regular part of your role or routine clinical practice.

- However it is important to us to have your perspective on how you are involved in all these aspects of care delivery for patients with diabetes, ***so please complete all of the questions for all aspects of care that are part of your clinical role***.
- If you do not prescribe you can omit the two clinical care areas relating to prescribing (2 and 5 above), but we will ask you to tell us whose role this is in your practice.

There are a number of core questions that are repeated for each of the six clinical care areas. Also, within each clinical area some questions are worded very similarly but they are measuring different things.

- **It is important for the study that you answer them all.**

Questions are answered by circling one number.

Please be sure to read the contents of the CLINICAL CARE AREA box at the beginning of each care area.

Clinical care area 1:

GIVING ADVICE ABOUT WEIGHT MANAGEMENT

The questions in this clinical area ask about your **provision of advice about weight management**, both **in general** and **over the next 12 months,** to patients with type 2 diabetes whose **BMI is above a target** of

30 kg/m^2

even following previous management.

Is giving advice about weight management to patients with type 2 diabetes part of your clinical role?

If NO: please **write below whose role this is in your practice**, then **GO TO page 14**

Name (or **Initials** if you have already listed this person on page 5**)**

If YES: **please continue below and complete all of the following questions in this clinical area**:

Target BMI: 30 kg/m^2

In my management of patients with diabetes whose BMI is above target …

	Strongly disagree						***Strongly agree***
Overall, it is highly likely that they will be worse off if I *provide advice about weight management*	1	2	3	4	5	6	7
On balance, the consequences for me as a GP/Nurse (e.g. stress, time, future consultations etc.) will be worse in the long run if I *provide advice about weight management*	1	2	3	4	5	6	7
On balance, my life as a GP/Nurse will be easier in the long run if I *provide advice about weight management*	1	2	3	4	5	6	7

I have a clear plan of …	***Strongly disagree***						***Strongly agree***
How I will *provide advice about weight management*	1	2	3	4	5	6	7
Under what circumstances I will *provide advice about weight management*	1	2	3	4	5	6	7
When I will *provide advice about weight management*	1	2	3	4	5	6	7

Target BMI: 30 kg/m^2

Over the next 12 months, given 10 patients whose BMI is above target, for how many do you intend to *provide advice about weight management?*

0	1	2	3	4	5	6	7	8	9	10

In my management of patients with diabetes whose BMI is above target

	Strongly disagree						***Strongly agree***
I think it is beneficial to them to *provide advice about weight management*	1	2	3	4	5	6	7
I think it is good practice to *provide advice about weight management*	1	2	3	4	5	6	7
I think it is a good use of my time to *provide advice about weight management*	1	2	3	4	5	6	7
I am expected to *provide advice about weight management*	1	2	3	4	5	6	7
I feel under pressure to *provide advice about weight management*	1	2	3	4	5	6	7
Most people whose opinions I value would approve if I *provide advice about weight management*	1	2	3	4	5	6	7
I am confident that I can *provide advice about weight management*	1	2	3	4	5	6	7
I intend to *provide advice about weight management*	1	2	3	4	5	6	7
It is entirely up to me whether or not I *provide advice about weight management*	1	2	3	4	5	6	7
I can overcome all obstacles, whatever they may be, to *provide advice about weight management*	1	2	3	4	5	6	7
I always consider *providing advice about weight management*	1	2	3	4	5	6	7
I plan to *provide advice about weight management*	1	2	3	4	5	6	7
It is my usual practice to *provide advice about weight management*	1	2	3	4	5	6	7
I expect to *provide advice about weight management*	1	2	3	4	5	6	7

I am confident that I can *provide advice about weight management* to any patient whose BMI is above target, even when …

	Strongly disagree						***Strongly agree***
The patient's BMI has been stable for 5 years	1	2	3	4	5	6	7
The patient's BMI has been increasing for 5 years	1	2	3	4	5	6	7
The patient is unwilling to discuss their weight	1	2	3	4	5	6	7
The clinic is busy and I am running 20 minutes late	1	2	3	4	5	6	7
The patient has osteoarthritis in their knees	1	2	3	4	5	6	7
The patient's BMI has been decreasing since you advised them to lose weight	1	2	3	4	5	6	7
The patient is depressed	1	2	3	4	5	6	7
The patient's values relating to body size differ from medical values	1	2	3	4	5	6	7
The patient has a low household income	1	2	3	4	5	6	7
Previous attempts by the patient to lose weight have been unsuccessful	1	2	3	4	5	6	7

Target BMI: 30 kg/m^2

Providing advice about weight management to patients whose BMI is above target *is something …*

	Strongly disagree						***Strongly agree***
I do frequently	1	2	3	4	5	6	7
I do automatically	1	2	3	4	5	6	7
I do without having to consciously remember	1	2	3	4	5	6	7
That makes me feel uncomfortable if I do not do it	1	2	3	4	5	6	7
I do without thinking	1	2	3	4	5	6	7
That would require effort not to do it	1	2	3	4	5	6	7
That belongs to my routine	1	2	3	4	5	6	7
I start doing before I realise I'm doing it	1	2	3	4	5	6	7
I would find hard not to do	1	2	3	4	5	6	7
I have no need to think about doing	1	2	3	4	5	6	7
That's typical for me	1	2	3	4	5	6	7
I have been doing for a long time	1	2	3	4	5	6	7

Providing advice about weight management **to patients whose BMI is above target is something that for me routinely includes …** (please tick all that apply)

1. Advising about calorie restriction ☐
2. Advising about increasing exercise ☐
3. Prescribing exercise ☐
4. Providing a printed leaflet ☐
5. Referral to the practice nurse ☐
6. Referral to a dietician ☐
7. Suggesting a commercial weight loss organisation ☐
8. Suggesting a commercial gym/exercise organisation ☐
9. Other (please specify)

.....

If, during an appointment with a patient whose BMI is above target, you are really pressed for time and could only do one of the above (1 – 9) which ONE would you do? .....

Target BMI: 30 kg/m^2

I have made a clear plan regarding *providing advice about weight management* to patients whose BMI is above target if …

	Strongly disagree						***Strongly agree***
The patient's BMI has been stable for 5 years	1	2	3	4	5	6	7
The patient's BMI has been increasing for 5 years	1	2	3	4	5	6	7
The patient is unwilling to discuss their weight	1	2	3	4	5	6	7
The clinic is busy and I am running 20 minutes late	1	2	3	4	5	6	7
The patient has osteoarthritis in their knees	1	2	3	4	5	6	7
The patient's BMI has been decreasing since you advised them to lose weight	1	2	3	4	5	6	7
The patient is depressed	1	2	3	4	5	6	7
The patient's values relating to body size differ from medical values	1	2	3	4	5	6	7
The patient has a low household income	1	2	3	4	5	6	7
Previous attempts by the patient to lose weight have been unsuccessful	1	2	3	4	5	6	7

Over the past 12 months, for approximately how many of the last 10 patients whose BMI was above target did you *provide advice about weight management*?

0	1	2	3	4	5	6	7	8	9	10

.....

Please now continue to Clinical care area 2 on next page

Clinical care area 2:

PRESCRIBING ADDITIONAL ANTIHYPERTENSIVE DRUGS

The questions in this clinical area ask about your **prescribing of additional antihypertensive drugs,** both **in general** and **over the next 12 months,** for patients with type 2 diabetes whose blood pressure (BP) is **5 mm Hg above a target** of

140 mm Hg Systolic BP or 80 mm Hg Diastolic BP

even following previous management.

Is deciding to prescribe antihypertensive drugs to patients with type 2 diabetes part of your clinical role?

If NO: please **write below whose role this is in your practice**, then **GO TO page 17**

Name (or **Initials** if you have already listed this person on page 5**)**

If YES: **please continue below and complete all of the following questions in this clinical area**:

Target BP: Systolic BP 140 mm Hg & Diastolic BP 80 mm Hg

In my management of patients with diabetes whose BP is 5 mm Hg above target …

	Strongly disagree						***Strongly agree***
Overall, it is highly likely that they will be worse off if I *prescribe them an additional antihypertensive drug*	1	2	3	4	5	6	7
On balance, the consequences for me as a GP/Nurse (e.g. stress, time, future consultations etc.) will be worse in the long run if I *prescribe an additional antihypertensive drug*	1	2	3	4	5	6	7
On balance, my life as a GP/Nurse will be easier in the long run if I *prescribe an additional antihypertensive drug*	1	2	3	4	5	6	7

I have a clear plan of …

	Strongly disagree						***Strongly agree***
How I will manage them by *prescribing an additional antihypertensive drug*	1	2	3	4	5	6	7
Under what circumstances I will *prescribe them an additional antihypertensive drug*	1	2	3	4	5	6	7
When I will prescribe them *an additional antihypertensive drug*	1	2	3	4	5	6	7

Target BP: Systolic BP 140 mm Hg & Diastolic BP 80 mm Hg

Over the next 12 months, given 10 patients whose BP is 5 mm Hg above target, for how many do you intend to *prescribe an additional antihypertensive drug*?

0	1	2	3	4	5	6	7	8	9	10

In my management of patients with diabetes whose BP is 5 mm Hg above target …

	Strongly disagree						***Strongly agree***
I think it is beneficial to them to *prescribe an additional antihypertensive drug*	1	2	3	4	5	6	7
I think it is good practice to *prescribe an additional antihypertensive drug*	1	2	3	4	5	6	7
I think it is a good use of my time to *prescribe an additional antihypertensive drug*	1	2	3	4	5	6	7
I am expected to *prescribe an additional antihypertensive drug*	1	2	3	4	5	6	7
I feel under pressure to *prescribe an additional antihypertensive drug*	1	2	3	4	5	6	7
Most people whose opinions I value would approve if I *prescribe an additional antihypertensive drug*	1	2	3	4	5	6	7
I am confident that I can *prescribe an additional antihypertensive drug*	1	2	3	4	5	6	7
I intend to *prescribe an additional antihypertensive drug*	1	2	3	4	5	6	7
It is entirely up to me whether or not I *prescribe an additional antihypertensive drug*	1	2	3	4	5	6	7
I can overcome all obstacles, whatever they may be, to *prescribing an additional antihypertensive drug*	1	2	3	4	5	6	7
I always consider *prescribing an additional antihypertensive drug* for any patient	1	2	3	4	5	6	7
I plan to *prescribe an additional antihypertensive drug*	1	2	3	4	5	6	7
It is my usual practice to *prescribe an additional antihypertensive drug*	1	2	3	4	5	6	7
I expect to *prescribe an additional antihypertensive drug*	1	2	3	4	5	6	7

I am confident that I can *prescribe an additional antihypertensive drug* to any patient with diabetes whose BP is 5 mm Hg above target, even when …

	Strongly disagree						***Strongly agree***
The patient has COPD	1	2	3	4	5	6	7
The clinic is busy and I am running 20 minutes late	1	2	3	4	5	6	7
The patient is having mild side effects from their current antihypertensive medication	1	2	3	4	5	6	7
The patient is already on maximum dosages of three hypertensive drugs	1	2	3	4	5	6	7
The patient is elderly	1	2	3	4	5	6	7
The patient is on seven other drugs	1	2	3	4	5	6	7
The patient is unhappy with the idea of taking more drugs	1	2	3	4	5	6	7
The patient has a past history of falls	1	2	3	4	5	6	7
There are three minutes of the consultation remaining	1	2	3	4	5	6	7

Target BP: Systolic BP 140 mm Hg & Diastolic BP 80 mm Hg

Prescribing an additional antihypertensive drug **for any patient whose BP is 5 mm Hg above target is something …**

	Strongly disagree						***Strongly agree***
I do frequently	1	2	3	4	5	6	7
I do automatically	1	2	3	4	5	6	7
I do without having to consciously remember	1	2	3	4	5	6	7
That makes me feel uncomfortable if I do not do it	1	2	3	4	5	6	7
I do without thinking	1	2	3	4	5	6	7
That would require effort not to do it	1	2	3	4	5	6	7
That belongs to my routine	1	2	3	4	5	6	7
I start doing before I realise I'm doing it	1	2	3	4	5	6	7
I would find hard not to do	1	2	3	4	5	6	7
I have no need to think about doing	1	2	3	4	5	6	7
That's typical for me	1	2	3	4	5	6	7
I have been doing for a long time	1	2	3	4	5	6	7

I have made a clear plan regarding ***prescribing an additional antihypertensive drug*** **for patients whose BP is 5 mm Hg above target if …**

	Strongly disagree						***Strongly agree***
The patient has COPD	1	2	3	4	5	6	7
The clinic is busy and I am running 20 minutes late	1	2	3	4	5	6	7
The patient is having mild side effects from their current antihypertensive medication	1	2	3	4	5	6	7
The patient is already on maximum dosages of three hypertensive drugs	1	2	3	4	5	6	7
The patient is elderly	1	2	3	4	5	6	7
The patient is on seven other drugs	1	2	3	4	5	6	7
The patient is unhappy with the idea of taking more drugs	1	2	3	4	5	6	7
The patient has a past history of falls	1	2	3	4	5	6	7
There are three minutes of the consultation remaining	1	2	3	4	5	6	7

Over the past 12 months, for approximately how many of the last 10 patients whose BP was 5 mm Hg above target did you ***prescribe an additional antihypertensive drug*****?**

0	1	2	3	4	5	6	7	8	9	10

.....

Clinical care area 3:

EXAMINING FOOT CIRCULATION AND SENSATION

The questions in this clinical area ask both **in general** and **over the next 12 months,** about your **examination of the circulation and sensation in the feet** of patients with type 2 diabetes registered with your practice.

Is examining the circulation and sensation in the feet of patients with type 2 diabetes part of your clinical role?

If NO: please **write below whose role this is in your practice**, then **GO TO page 20**

Name (or Initials) if you have already listed this person on page 5)

If YES: please continue below and complete all of the following questions in this clinical area:

Target: Any patient with type 2 diabetes registered with your practice

In my management of patients with diabetes …	***Strongly disagree***						***Strongly agree***
Overall, it is highly likely that patients will be worse off if I *examine the circulation and sensation in their feet*	1	2	3	4	5	6	7
On balance, the consequences for me as a GP/Nurse (e.g. stress, time, future consultations etc.) will be worse in the long run if I *examine the circulation and sensation in their feet*	1	2	3	4	5	6	7
On balance, my life as a GP/Nurse will be easier in the long run if I *examine the circulation and sensation in their feet*	1	2	3	4	5	6	7

I have a clear plan of …	***Strongly disagree***						***Strongly agree***
How I will *examine the **circulation** in their feet*	1	2	3	4	5	6	7
How I will *examine the **sensation** in their feet*	1	2	3	4	5	6	7
Under what circumstances I will *examine the **circulation and sensation** in their feet*	1	2	3	4	5	6	7
When I will *examine the **circulation and sensation** in their feet*	1	2	3	4	5	6	7

Target: Any patient with type 2 diabetes registered with your practice

Over the next 12 months, given 10 patients with diabetes, for how many do you intend to *examine the circulation and sensation in their feet*?

0	1	2	3	4	5	6	7	8	9	10

In my management of patients with diabetes …	***Strongly disagree***						***Strongly agree***
I think it is beneficial to them to *examine the circulation and sensation in their feet*	1	2	3	4	5	6	7
I think it is good practice to *examine the circulation and sensation in their feet*	1	2	3	4	5	6	7
I think it is a good use of my time to *examine the circulation and sensation in their feet*	1	2	3	4	5	6	7
I am expected to *examine the circulation and sensation in their feet*	1	2	3	4	5	6	7
I feel under pressure to *examine the circulation and sensation in their feet*	1	2	3	4	5	6	7
Most people whose opinions I value would approve if I *examine the circulation and sensation in their feet*	1	2	3	4	5	6	7
I am confident that I can *examine the circulation and sensation in their feet*	1	2	3	4	5	6	7
I intend to *examine the circulation and sensation in their feet*	1	2	3	4	5	6	7
It is entirely up to me whether or not I *examine the circulation and sensation in their feet*	1	2	3	4	5	6	7
I can overcome all obstacles, whatever they may be, to *examine the circulation and sensation in their feet*	1	2	3	4	5	6	7
I always consider *examining the circulation and sensation in their feet*	1	2	3	4	5	6	7
I plan to *examine the circulation and sensation in their feet*	1	2	3	4	5	6	7
It is my usual practice to *examine the circulation and sensation in their feet*	1	2	3	4	5	6	7
I expect to *examine the circulation and sensation in their feet*	1	2	3	4	5	6	7

I am confident that I can *examine the*

***CIRCULATION in the feet* of patients with diabetes, even when …**	***Strongly disagree***						***Strongly agree***
The patient has poor hygiene	1	2	3	4	5	6	7
The clinic is busy and I am running 20 minutes late	1	2	3	4	5	6	7
The patient has poor mobility	1	2	3	4	5	6	7
The patient is wearing tights and needs additional time to undress	1	2	3	4	5	6	7

***SENSATION in the feet* of patients with diabetes, even when …**	***Strongly disagree***						***Strongly agree***
The patient has poor hygiene	1	2	3	4	5	6	7
The clinic is busy and I am running 20 minutes late	1	2	3	4	5	6	7
The patient has poor mobility	1	2	3	4	5	6	7
The patient is wearing tights and needs additional time to undress	1	2	3	4	5	6	7

Target: Any patient with type 2 diabetes registered with your practice

I have made a clear plan regarding how to *examine the circulation and sensation in the feet* of patients with diabetes if …

	Strongly disagree						***Strongly agree***
The patient has poor hygiene	1	2	3	4	5	6	7
The clinic is busy and I am running 20 minutes late	1	2	3	4	5	6	7
The patient has poor mobility	1	2	3	4	5	6	7
The patient is wearing tights and needs additional time to undress	1	2	3	4	5	6	7

***Examining the circulation and sensation in the feet* of patients with diabetes is something**

	Strongly disagree						***Strongly agree***
I do frequently	1	2	3	4	5	6	7
I do automatically	1	2	3	4	5	6	7
I do without having to consciously remember	1	2	3	4	5	6	7
That makes me feel uncomfortable if I do not do it	1	2	3	4	5	6	7
I do without thinking	1	2	3	4	5	6	7
That would require effort not to do it	1	2	3	4	5	6	7
That belongs to my routine	1	2	3	4	5	6	7
I start doing before I realise I'm doing it	1	2	3	4	5	6	7
I would find hard not to do	1	2	3	4	5	6	7
I have no need to think about doing	1	2	3	4	5	6	7
That's typical for me	1	2	3	4	5	6	7
I have been doing for a long time	1	2	3	4	5	6	7

As a routine part of YOUR CLINICAL ROLE, do you examine the ...

***CIRCULATION in the feet* of patients with diabetes? (Please tick)** ☐ **Yes** ☐ **No**

***SENSATION in the feet* of patients with diabetes?** (Please **tick**) ☐ **Yes** ☐ **No**

If, during an appointment with a patient with diabetes, you are really pressed for time and could only do one thing, which one of the following would you do in terms of examining their feet?

(please circle one)

Circulation Sensation Both Neither

Over the past 12 months, for approximately how many of the last 10 patients with diabetes did you *examine the circulation and sensation in their feet*?

0	1	2	3	4	5	6	7	8	9	10

.....

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Clinical care area 4:

PROVIDING ADVICE ABOUT SELF-MANAGEMENT

The questions in this clinical area ask, both **in general** and **over the next 12 months**, about your **provision of advice about self-management** to patients with type 2 diabetes registered with your practice.

Is providing advice about self-management to patients with type 2 diabetes part of your clinical role?

If NO: please **write below whose role this is in your practice**, then **GO TO page 24**

Name (or **Initials)** if you have already listed this person on page 5**)**

If YES: please continue below and complete all of the following questions in this clinical area:

Target: Any patient with type 2 diabetes registered with your practice

In my management of patients with diabetes …

	Strongly disagree						***Strongly agree***
Overall, it is highly likely that they will be worse off if I *provide advice about their self-management*	1	2	3	4	5	6	7
On balance, the consequences for me as a GP/Nurse (e.g. stress, time, future consultations etc.) will be worse in the long run if I *provide advice about their self-management*	1	2	3	4	5	6	7
On balance, my life as a GP/Nurse will be easier in the long run if I *provide advice about their self-management*	1	2	3	4	5	6	7

I have a clear plan of …

	Strongly disagree						***Strongly agree***
How I will *provide advice about their self-management*	1	2	3	4	5	6	7
Under what circumstances I will *provide advice about their self-management*	1	2	3	4	5	6	7
When I will *provide advice about their self-management*	1	2	3	4	5	6	7

Target: Any patient with type 2 diabetes registered with your practice

Over the next 12 months, given 10 patients with diabetes, for how many of these patients do you intend to *provide advice about their self-management*?

0	1	2	3	4	5	6	7	8	9	10

In my management of patients with diabetes …	***Strongly disagree***						***Strongly agree***
I think it is beneficial to them to *provide advice about their self-management*	1	2	3	4	5	6	7
I think it is good practice to *provide advice about their self-management*	1	2	3	4	5	6	7
I think it is a good use of my time to *provide advice about their self-management*	1	2	3	4	5	6	7
I am expected to *provide advice about their self-management*	1	2	3	4	5	6	7
I feel under pressure to *provide advice about their self-management*	1	2	3	4	5	6	7
Most people whose opinions I value would approve if I *provide advice about their self-management*	1	2	3	4	5	6	7
I am confident that I can *provide advice about their self-management*	1	2	3	4	5	6	7
I intend to *provide advice about their self-management*	1	2	3	4	5	6	7
It is entirely up to me whether or not *I provide advice about their self-management*	1	2	3	4	5	6	7
I can overcome all obstacles, whatever they may be, to *provide advice about their self-management*	1	2	3	4	5	6	7
I always consider *providing advice about self-management*	1	2	3	4	5	6	7
I expect to *provide them with advice about self-management*	1	2	3	4	5	6	7
It is my usual practice to *provide advice about self-management* to patients with diabetes	1	2	3	4	5	6	7
I plan to *provide advice about their self-management*	1	2	3	4	5	6	7

I am confident that I can *provide advice about self-management*, even when …

	Strongly disagree						***Strongly agree***
The patient's diabetes is managed by diet alone	1	2	3	4	5	6	7
The clinic is busy and I am running 20 minutes late	1	2	3	4	5	6	7
The patient has their own monitor and expects you to prescribe specific lancets or strips	1	2	3	4	5	6	7
There are three minutes of the consultation remaining	1	2	3	4	5	6	7
The patient has a low household income	1	2	3	4	5	6	7
The patient has low educational attainment	1	2	3	4	5	6	7
The patient is worried about becoming hypoglycaemic and is diet controlled	1	2	3	4	5	6	7
The patient has been given conflicting advice about self-monitoring from other influential sources	1	2	3	4	5	6	7
The patient expects their doctor to manage their diabetes for them	1	2	3	4	5	6	7

Target: Any patient with type 2 diabetes registered with your practice

Providing patients with advice on the self-management **of their diabetes is something …**

	Strongly disagree						***Strongly agree***
I do frequently	1	2	3	4	5	6	7
I do automatically	1	2	3	4	5	6	7
I do without having to consciously remember	1	2	3	4	5	6	7
That makes me feel uncomfortable if I do not do it	1	2	3	4	5	6	7
I do without thinking	1	2	3	4	5	6	7
That would require effort not to do it	1	2	3	4	5	6	7
That belongs to my routine	1	2	3	4	5	6	7
I start doing before I realise I'm doing it	1	2	3	4	5	6	7
I would find hard not to do	1	2	3	4	5	6	7
I have no need to think about doing	1	2	3	4	5	6	7
That's typical for me	1	2	3	4	5	6	7
I have been doing for a long time	1	2	3	4	5	6	7

Providing patients with advice on the self-management **of their diabetes is something that for me routinely includes …** (please tick all that apply)

1. Advising about the nutritional content of their diet ..... ☐
2. Providing disposable equipment for self-monitoring of blood glucose ..... ☐
3. Suggesting NHS course for training diabetic patients in self-management ..... ☐
4. Referral to the practice nurse ..... ☐
5. Referral to a dietician..... ☐
6. Giving advice that takes into account individual circumstances..... ☐
7. Other (please specify) .....

.....

If, during an appointment with a patient with diabetes, you are really pressed for time and could only do one of the above (1 to 7), which ONE would you do? ……

Target: Any patient with type 2 diabetes registered with your practice

I have made a detailed plan regarding *providing advice about their self-management* to patients with diabetes if …

	Strongly disagree						***Strongly agree***
The patient's diabetes is managed by diet alone	1	2	3	4	5	6	7
The clinic is busy and I am running 20 minutes late	1	2	3	4	5	6	7
The patient has their own monitor and expects you to prescribe specific lancets or strips	1	2	3	4	5	6	7
There are three minutes of the consultation remaining	1	2	3	4	5	6	7
The patient has a low household income	1	2	3	4	5	6	7
The patient has low educational attainment	1	2	3	4	5	6	7
The patient is worried about becoming hypoglycaemic and is diet controlled	1	2	3	4	5	6	7
The patient has been given conflicting advice about self-monitoring from other influential sources	1	2	3	4	5	6	7
The patient expects their doctor to manage their diabetes for them	1	2	3	4	5	6	7

Over the past 12 months, for approximately how many of the last 10 patients with diabetes did you *provide advice about their self-management*?

0	1	2	3	4	5	6	7	8	9	10

.....

Please now continue to Clinical care area 5 on next page

Clinical care area 5:

PRESCRIBING AN ADDITIONAL THERAPY FOR THE MANAGEMENT OF GLYCAEMIC CONTROL (HBA1C)

The questions in this clinical area ask about the **prescribing of an additional therapy**, both **in general** and **over the next 12 months**, for the management of HbA1c in patients with type 2 diabetes whose

HbA1c is higher than 8.0%

despite maximum dosage of two oral hypoglycaemic drugs.

Is deciding to prescribe additional therapy for patients with type 2 diabetes who are already on maximum dosage of two oral hypoglycaemic drugs part of your clinical role?

If NO: please **write below whose role this is in your practice**, then **GO TO page 27**

Name (or **Initials** if you have already listed this person on page 5**)**

If YES: please continue below and complete all of the following questions in this clinical area:

Target HbA1c: 8.0%

In my management of patients with diabetes whose HbA1c is above target …

	Strongly disagree						***Strongly agree***
Overall, it is highly likely that they will be worse off if I *prescribe an additional therapy*	1	2	3	4	5	6	7
On balance, the consequences for me as a GP/Nurse (e.g. stress, time, future consultations etc.) will be worse in the long run if I *prescribe an additional therapy*	1	2	3	4	5	6	7
On balance, my life as a GP/Nurse will be easier in the long run if I *prescribe an additional therapy*	1	2	3	4	5	6	7

I have a clear plan of …

	Strongly disagree						***Strongly agree***
How I will manage them by *prescribing an additional therapy*	1	2	3	4	5	6	7
Under what circumstances I will *prescribe an additional therapy*	1	2	3	4	5	6	7
When I will *prescribe an additional therapy*	1	2	3	4	5	6	7

Target HbA1c: 8.0%

Over the next 12 months, given 10 patients whose HbA1c is above target, for how many do you intend to *prescribe an additional therapy*?

0	1	2	3	4	5	6	7	8	9	10

In my management of patients with diabetes whose HbA1c is above target …

	Strongly disagree						***Strongly agree***
I think it is beneficial to them to *prescribe an additional therapy*	1	2	3	4	5	6	7
Good practice to *prescribe an additional therapy*	1	2	3	4	5	6	7
A good use of my time to *prescribe an additional therapy*	1	2	3	4	5	6	7
I am expected to *prescribe an additional therapy*	1	2	3	4	5	6	7
I feel under pressure to *prescribe an additional therapy*	1	2	3	4	5	6	7
Most people whose opinions I value would approve if I *prescribe an additional therapy*	1	2	3	4	5	6	7
I am confident that I can *prescribe an additional therapy*	1	2	3	4	5	6	7
I intend to *prescribe an additional therapy*	1	2	3	4	5	6	7
It is entirely up to me whether or not I *prescribe an additional therapy*	1	2	3	4	5	6	7
I can overcome all obstacles, whatever they may be, to *prescribing an additional therapy*	1	2	3	4	5	6	7
I always consider *prescribing an additional therapy*	1	2	3	4	5	6	7
I plan to *prescribe an additional therapy*	1	2	3	4	5	6	7
It is my usual practice to *prescribe an additional therapy*	1	2	3	4	5	6	7
I expect to *prescribe an additional therapy*	1	2	3	4	5	6	7

I am confident that I can *prescribe additional therapy* for a patient whose HbA1c above target, even when …

	Strongly disagree						***Strongly agree***
The patient has had laser treated maculopathy	1	2	3	4	5	6	7
The clinic is busy and I am running 20 minutes late	1	2	3	4	5	6	7
The patient is having mild side effects from their current hypoglycaemic medication	1	2	3	4	5	6	7
The patient is depressed	1	2	3	4	5	6	7
The patient has a BMI >35 Kg/m^2	1	2	3	4	5	6	7
The patient is on seven other drugs	1	2	3	4	5	6	7
The patient is unhappy with the idea of taking more drugs	1	2	3	4	5	6	7
There are three minutes of the consultation remaining	1	2	3	4	5	6	7

Target HbA1c: 8.0%

I have made a clear plan regarding the *prescribing of an additional therapy* for patients whose HbA1c is above target if …

	Strongly disagree						***Strongly agree***
The patient has had laser treated maculopathy	1	2	3	4	5	6	7
The clinic is busy and I am running 20 minutes late	1	2	3	4	5	6	7
The patient is having mild side effects from their current hypoglycaemic medication	1	2	3	4	5	6	7
The patient is depressed	1	2	3	4	5	6	7
The patient has a BMI >35 Kg/m^2	1	2	3	4	5	6	7
The patient is on seven other drugs	1	2	3	4	5	6	7
The patient is unhappy with the idea of taking more drugs	1	2	3	4	5	6	7
There are three minutes of the consultation remaining	1	2	3	4	5	6	7

***Prescribing an additional therapy* for any patient whose HbA1c is above target is something …**

	Strongly disagree						***Strongly agree***
I do frequently	1	2	3	4	5	6	7
I do automatically	1	2	3	4	5	6	7
I do without having to consciously remember	1	2	3	4	5	6	7
That makes me feel uncomfortable if I do not do it	1	2	3	4	5	6	7
I do without thinking	1	2	3	4	5	6	7
That would require effort not to do it	1	2	3	4	5	6	7
That belongs to my routine	1	2	3	4	5	6	7
I start doing before I realise I'm doing it	1	2	3	4	5	6	7
I would find hard not to do	1	2	3	4	5	6	7
I have no need to think about doing	1	2	3	4	5	6	7
That's typical for me	1	2	3	4	5	6	7
I have been doing for a long time	1	2	3	4	5	6	7

Over the past 12 months, for approximately how many of the last 10 patients whose HbA1c was above target did you *prescribe an additional therapy*?

0	1	2	3	4	5	6	7	8	9	10

.....

Clinical care area 6:

PROVIDING GENERAL EDUCATION ABOUT DIABETES

The questions in this clinical area ask, both **in general** and **over the next 12 months**, about your **provision of general education** to patients with type 2 diabetes registered with your practice.

Is providing general education to patients with type 2 diabetes part of your clinical role?

If NO: please **write below whose role this is in your practice**, then **GO TO page 33**

Name (or **Initials** if you have already listed this person on page 5**)**

If YES: please continue below and complete all of the following questions in this clinical area:

Target: Any patient with type 2 diabetes registered with your practice

In my management of patients with diabetes …

	Strongly disagree						***Strongly agree***
Overall, it is highly likely that they will be worse off if I *provide general education about diabetes*	1	2	3	4	5	6	7
On balance, the consequences for me as a GP/Nurse (e.g. stress, time, future consultations etc.) will be worse in the long run if I *provide general education about diabetes*	1	2	3	4	5	6	7
On balance, my life as a GP/Nurse will be easier in the long run if I *provide general education about diabetes*	1	2	3	4	5	6	7

I have a clear plan of …

	Strongly disagree						***Strongly agree***
How I will *provide general education about diabetes*	1	2	3	4	5	6	7
Under what circumstances I will *provide general education about diabetes*	1	2	3	4	5	6	7
When I will *provide general education about diabetes*	1	2	3	4	5	6	7

Target: Any patient with type 2 diabetes registered with your practice

Over the next 12 months, given 10 patients with diabetes, for how many do you intend to *provide general education* about diabetes?

0	1	2	3	4	5	6	7	8	9	10

In my management of patients with diabetes …

	Strongly disagree						***Strongly agree***
I think it is beneficial to *provide general education about diabetes*	1	2	3	4	5	6	7
I think it is good practice to *provide general education about diabetes*	1	2	3	4	5	6	7
I think it is a good use of my time to *provide general education about diabetes*	1	2	3	4	5	6	7
I am expected to *provide general education about diabetes*	1	2	3	4	5	6	7
I feel under pressure to *provide general education about diabetes*	1	2	3	4	5	6	7
Most people whose opinions I value would approve if I *provide general education about diabetes*	1	2	3	4	5	6	7
I am confident that I can *provide general education about diabetes*	1	2	3	4	5	6	7
I intend to *provide general education about diabetes*	1	2	3	4	5	6	7
It is entirely up to me whether or not I *provide general education about diabetes*	1	2	3	4	5	6	7
I can overcome all obstacles, whatever they may be, *to providing general education about diabetes*	1	2	3	4	5	6	7
I always consider *providing general education about diabetes*	1	2	3	4	5	6	7
I plan to *provide general education about diabetes*	1	2	3	4	5	6	7
It is my usual practice to *provide general education about diabetes*	1	2	3	4	5	6	7
I expect to *provide general education about diabetes*	1	2	3	4	5	6	7

I am confident that I can *provide general education about diabetes*, even when …

	Strongly disagree						***Strongly agree***
The patient's attendance on structured education programs is sporadic	1	2	3	4	5	6	7
The clinic is busy and I am running 20 minutes late	1	2	3	4	5	6	7
The patient is unenthusiastic about attending a structured education program	1	2	3	4	5	6	7
The patient has recently had an MI	1	2	3	4	5	6	7
The patient is depressed	1	2	3	4	5	6	7
There are three minutes of the consultation remaining	1	2	3	4	5	6	7
The patient has a low educational attainment	1	2	3	4	5	6	7
The patient is registered as partially sighted	1	2	3	4	5	6	7
The patient is hearing impaired	1	2	3	4	5	6	7
I have run out of printed leaflets	1	2	3	4	5	6	7
My Practice doesn't support structured education	1	2	3	4	5	6	7

Target: Any patient with type 2 diabetes registered with your practice

Providing patients with general education **about diabetes is something …**

	Strongly disagree						***Strongly agree***
I do frequently	1	2	3	4	5	6	7
I do automatically	1	2	3	4	5	6	7
I do without having to consciously remember	1	2	3	4	5	6	7
That makes me feel uncomfortable if I do not do it	1	2	3	4	5	6	7
I do without thinking	1	2	3	4	5	6	7
That would require effort not to do it	1	2	3	4	5	6	7
That belongs to my routine	1	2	3	4	5	6	7
I start doing before I realise I'm doing it	1	2	3	4	5	6	7
I would find hard not to do	1	2	3	4	5	6	7
I have no need to think about doing	1	2	3	4	5	6	7
That's typical for me	1	2	3	4	5	6	7
I have been doing for a long time	1	2	3	4	5	6	7

Providing patients with general education **about diabetes is something that for me routinely includes …** *(please tick all that apply)*

1. Medical management ☐
2. What the symptoms of diabetes are ☐
3. The time course of diabetes ☐
4. The cause of diabetes ☐
5. How the patient is involved in controlling diabetes ☐
6. Ensuring that they understand ☐
7. Providing a leaflet/printed materials ☐
8. Recommending a diabetes education course ☐
9. Recommending Diabetes UK ☐
10. Other (please specify) .....

.....

If, during an appointment with a patient with diabetes, you are really pressed for time and could only do one of the above (1 to 10), which ONE would you do? .....

Target: Any patient with type 2 diabetes registered with your practice

I have made a clear plan regarding *providing general education* about diabetes if …

	Strongly disagree						***Strongly agree***
The patient's attendance on structured education programs is sporadic	1	2	3	4	5	6	7
The clinic is busy and I am running 20 minutes late	1	2	3	4	5	6	7
The patient is unenthusiastic about attending a structured education program	1	2	3	4	5	6	7
The patient has recently had an MI	1	2	3	4	5	6	7
The patient is depressed	1	2	3	4	5	6	7
There are three minutes of the consultation remaining	1	2	3	4	5	6	7
The patient has a low educational attainment	1	2	3	4	5	6	7
The patient is registered as partially sighted	1	2	3	4	5	6	7
The patient is hearing impaired	1	2	3	4	5	6	7
I have run out of printed leaflets	1	2	3	4	5	6	7
Your Practice doesn't support structured education	1	2	3	4	5	6	7

Over the past 12 months for approximately how many of the last 10 patients with diabetes, did you *provide general education*?

0	1	2	3	4	5	6	7	8	9	10

When managing patients with diabetes you have to perform multiple tasks under time constraints. We are interested in how you manage this process.

Due to clinic constraints I have to see a patient for annual review in a 20 minute appointment; I intend to prioritise each of these pairs of actions as follows … (please tick one box for each pair)

Advise about weight management	☐	☐	☐	**Give equal priority**	☐	☐	**Give education about diabetes**
Advise about self-management	☐	☐	☐	**Give equal priority**	☐	☐	**Advise about weight management**
Give education about diabetes	☐	☐	☐	**Give equal priority**	☐	☐	**Advise about self-management**

.....

Thank you!

You have now completed the second section of the questionnaire.

Please now continue to the final part of the questionnaire, SECTION THREE, on page 33.

SECTION THREE

The following pages contain a series of scenarios which include elements that may influence your management of patients with diabetes.

We would like you to consider each scenario in the context of a routine review of a patient with type 2 diabetes.

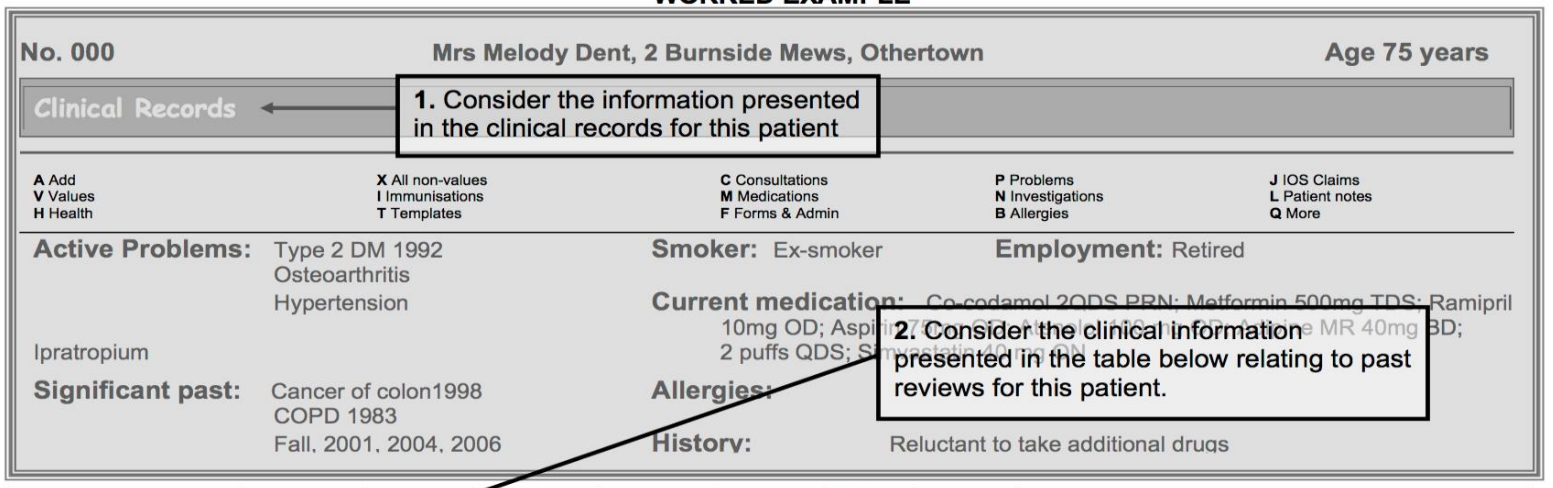
We appreciate that the observational and communication skills you may normally draw on during an actual consultation cannot be a factor in your decision.

Please try to consider each scenario based on the information presented then, in the space provided, record your decisions relating to:

- Management
- How difficult it was for you to decide your management of each scenario.

A worked example is provided on pages 34 & 35 overleaf.

WORKED EXAMPLE



	14/08/04	28/07/05	04/09/06	18/08/07	10/09/08	Would do	If time allows	What would you do?
HbA1c	8.3	8.0	7.3	7.7	8.4			
Cholesterol	5.4	3.9	4.2	4.1	4.3			
Systolic BP					145			
Diastolic BP					80			
Albumin:Cre ratio (norma					1.0			
Foot inspect								
BMI	33	33	33	34	34			
Patient education	√							
Weight management								
Self-manager								
Notes		Start Ramipril		ease ipril				

3. Tick the aspects of care that you consider to be the most important for this patient and that you **would prioritise to do** during this consultation.

4. Tick the aspects of care that you also consider to be important for this patient and that you **would do <u>if time allows</u>** during this consultation.

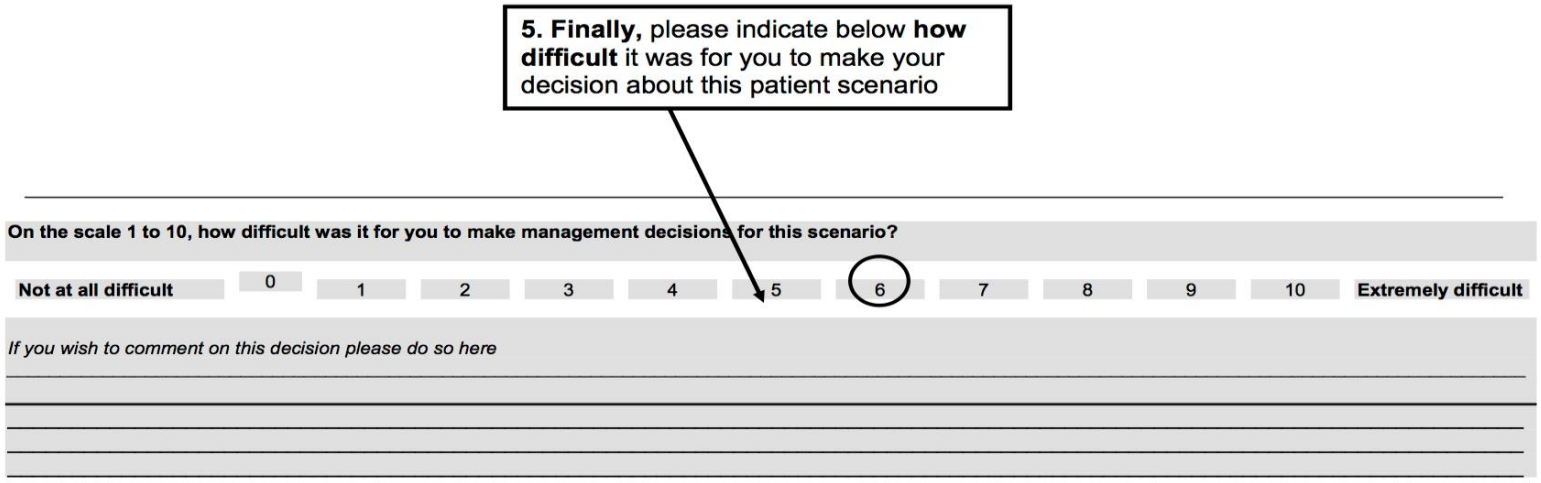
- **This is a 15 minute consultation, so start with the most important elements of care and tick those that you *Would do* during this consultation and then tick the ones that you would prioritise to do only if you have time *(If time allows).***

- **Use the last three columns in the table above to indicate the elements of your management of this patient.**

- **Write a brief description of *what it is you would do* in the last column.**

You can add additional comments in the space provided below the table if necessary.

Comments:



No. 001 **Ms Sarah Mathers,** **Sycamore Avenue, Othertown** **Age 67 years**

Clinical Records

A Add **V** Values **H** Health | **X** All non-values **I** Immunisations **T** Templates | **C** Consultations **M** Medications **F** Forms & Admin | **P** Problems **N** Investigations **B** Allergies | **J** IOS Claims **L** Patient notes **Q** More

Active Problems: Type 2 DM 1996
Atrial Fibrillation
Hypertension

Smoker: Ex-smoker

Employment: Retired

Significant past: Hip replacement 2007
L CVA 2000
Depression, 1991, 2001

Current medication: Atenolol 100 mg OD; Metformin 800mg BD; Adizem-SR 120 BD; Simvastatin 40 mg ON; Doxazosin 8mg OD; Warfarin as directed

Allergies: Ramipril: rash 2006

History:

	14/08/05	28/07/06	04/09/07	18/03/08	10/09/08	Would do	Would do if time	What would you do?
HbA1c	8.3	8.4	7.8	7.6	7.6			
Cholesterol	4.7	5.2	4.6	4.6	4.8			
Systolic BP	162	150	140	148	156			
Diastolic BP	88	88	84	86	88			
Albumin:Creatinine ratio (normal <2.5)	0.8	1.5	1.4	0.9	1.3			
Foot inspection	√	√	√					
BMI	29	29.6	31.8	32.3	32.5			
Patient education	√		√					
Weight management	√	√	√	√				
Self-management		√						
Notes	Add Metformin	Add Ramipril Increase Metformin Add Doxazosin	Increase Doxazosin	Increase Doxazosin				

- **This is a 15 minute consultation, so start with the most important elements of care and tick those that you *Would do* during this consultation and then tick the ones that you would prioritise to do only if you have time *(Would do if time).***

- **Use the last three columns in the table above to indicate the elements of your management of this patient.**

- **Write a brief description of *what it is you would do* in the last column.**

You can add additional comments in the space provided below the table if necessary.

Comments:

On the scale 1 to 10, how difficult was it for you to make management decisions for this scenario?												
Not at all difficult	0	1	2	3	4	5	6	7	8	9	10	**Extremely difficult**

If you wish to comment on this decision please do so here

_____

_____

_____

_____

_____

No. 003 **Mr Jarrod Burns,** **58 St Thomas' Drive, Othertown** **Age 72 years**

Clinical Records

A Add **V** Values Health | **X** All non-values **I** Immunisations **T** Templates | **C** Consultations **M** Medications **F** Forms & Admin | **P** Problems **N** Investigations **B** Allergies | **J** IOS Claims **L** Patient notes **Q** More

Active Problems: Type 2 DM 1998
Angina
Hypertension
Heart failure

Smoker: Non-smoker

Employment: Retired

Significant past: Hip replacement 2005
Prostrate cancer 2006
CABG 1996

Current medication: Ramipril 10mg OD; Simvastatin 40 mg ON; Isosorbide mononitrate 20mg bd; Adipine MR 40mg BD

Allergies:

History:

	11/06/04	26/08/05	24/09/06	17/07/07	10/09/08	Would do	Would do if time	What would you do?
HbA1c	8.2	8.4	8.1	7.9	7.8			
Cholesterol	5.3	5.1	4.9	4.8	4.8			
Systolic BP	155	152	152	154	150			
Diastolic BP	78	74	74	74	78			
Albumin:Creatinine ratio (normal <2.5)	1.6	1.6	1.7	1.4	1.2			
Foot inspection	√	√	√	√				
BMI	34	34	33.6	33.3	33			
Patient education		√						
Weight management	√	√	√	√				
Self-management	√			√				
Notes	Encourage weight loss Add Adepine	Encourage weight loss Increase Adepine	Encourage weight loss	Encourage weight loss				

- **This is a 15 minute consultation, so start with the most important elements of care and tick those that you *Would do* during this consultation and then tick the ones that you would prioritise to do only if you have time *(Would do if time).***

- **Use the last three columns in the table above to indicate the elements of your management of this patient.**

- **Write a brief description of *what it is you would do* in the last column.**

You can add additional comments in the space provided below the table if necessary.

Comments:

On the scale 1 to 10, how difficult was it for you to make management decisions for this scenario?

Not at all difficult	0	1	2	3	4	5	6	7	8	9	10	**Extremely difficult**

If you wish to comment on this decision please do so here

Thank you!

You have now completed your questionnaire!

Is there any other comment you would like to make at this point?

_____
_____
_____
_____
_____
_____

Please now return your completed questionnaire, sealed in the envelope provided, to the study contact for your practice.

If you have any queries or wish to find out more about this study please contact:

Susan Hrisos

Research Associate
Institute of Health & Society
Newcastle University
21 Claremont Place
Newcastle upon Tyne
NE2 4AA

Tel: 0191 222 6774

Email: susan.hrisos@ncl.ac.uk

Appendix I. iQuaD follow-up questionnaire

Confidential

Newcastle University

Diabetes UK

Institute of Health&Society

Improving the delivery of care for patients with type 2 diabetes

Clinician Follow-up Questionnaire 2009

1. What is your role within this General Practice? (Please circle)

Practice nurse Nurse Specialist (Specialty:.....) Nurse Practitioner

Nurse Prescriber District Nurse GP (Salaried) GP (Partner)

Other (please specify).....

2. How long have you worked at this general practice? ..... Years ..... Months

Questions 3 & 4 ask about you **providing advice about weight management, both in general and over the past 12 months**, to patients with type 2 diabetes whose **BMI is above a target** of **30 kg/m^2** even following previous management.

3. Is giving advice about weight management to patients with type 2 diabetes part of your clinical role? ☐ Yes **GO TO Q4** ☐ No **GO TO Q5**

4. Over the past 12 months, given 10 patients with diabetes whose BMI was above target, **for how many did you *provide advice about weight management?*** ***(Please circle one number)***

0	1	2	3	4	5	6	7	8	9	10

Questions 5 & 6 ask about you **prescribing additional antihypertensive drugs, both in general and over the past 12 months,** for patients with type 2 diabetes whose blood pressure (BP) is **5mm Hg above a target of 140 mm Hg Systolic BP or 80 mm Hg Diastolic BP, even following previous management.**

5. Is deciding to prescribe antihypertensive drugs to patients with type 2 diabetes part of your clinical role? ☐ Yes **GO TO Q6** ☐ No **GO TO Q7**

6. Over the past 12 months, given 10 patients with diabetes whose BP was 5 mm Hg above target, **for how many did you *prescribe an additional antihypertensive drug?***

(Please circle one number)

0	1	2	3	4	5	6	7	8	9	10

Questions 7 & 8 ask about you **examining the circulation and sensation in the feet, both in general and over the past 12 months,** of patients with type 2 diabetes registered with your practice,.

7. Is examining the circulation and sensation in the feet of patients with type 2 diabetes part of your clinical role? ☐ **Yes GO TO Q8** ☐ **No GO TO Q9**

8. Over the past 12 months, given 10 patients with diabetes, **for how many did you *examine the circulation and sensation in their feet*?** ***(Please circle one number)***

0	1	2	3	4	5	6	7	8	9	10

Questions 9 & 10 ask about you **providing advice about self-management, both in general and over the past 12 months,** to patients with type 2 diabetes registered with your practice.

9. Is providing advice about self-management to patients with diabetes part of your clinical role? ☐ **Yes GO TO Q10** ☐ **No GO TO Q11**

10. Over the past 12 months, given 10 patients with diabetes, **for how many of these patients did you *provide advice about their self-management*?** ***(Please circle one number)***

0	1	2	3	4	5	6	7	8	9	10

Questions 11 & 12 ask, **both in general and over the past 12 months,** about you **prescribing an additional therapy** for the management of HbA1c in patients with type 2 diabetes whose **HbA1c is higher than 8.0% despite maximum dosage of two oral hypoglycaemic drugs.**

11. Is deciding to prescribe additional therapy for patients with type 2 diabetes part of your clinical role? ☐ **Yes GO TO Q12** ☐ **No GO TO Q13**

12. Over the past 12 months, given 10 patients with diabetes whose HbA1c is above target, for how many did you *prescribe an additional therapy*? ***(Please circle one number)***

0	1	2	3	4	5	6	7	8	9	10

Questions 13 & 14 ask, both **in general** and **over the past 12 months**, about you **providing general education** to patients with type 2 diabetes registered with your practice.

13. Is providing general education to patients with type 2 diabetes part of your clinical role? ☐ **Yes GO TO Q14** ☐ **No**

14. Over the past 12 months, given 10 patients with diabetes, for how many did you *provide general education* about diabetes? ***(Please circle one number)***

0	1	2	3	4	5	6	7	8	9	10

Thank you for completing this questionnaire.

Please now return it to us in the pre-paid envelope provided.

Appendix J. Example search PsycInfo

Example search PsycInfo

#	Searches
1	habits/
2	(habit* or learning or operant* or automa* or (Past adj5 Behav*)).ab,ti.
3	1 or 2
4	intention/
5	((intent* or intend*) and behav*).ab,ti.
6	4 or 5
7	3 and 6
8	health personnel/
9	(Clinician or physician* or doctor* or family practition* or general practition* or gp* or fp* or dent* or gyn?ecologist* or h?ematologist* or (health adj professional*) or internist* or neurologist* or nurse* or obstetrician* or occupational therapist* or optometrist* or ot* or P?ediatrician* or paramedic* or pharmacist* or physiotherapist* or psychiatrist* or psychologist* or radiologist* or social worker* or surgeon*).ab,ti.
10	8 or 9
11	7 and 10

Appendix K. Quality assessment tool

	Yes	No	Other (CD, NR, NA)*
1. Was the research question or objective in this paper clearly stated? ➢ *Goals and/or research questions are clearly described*			
2. Was the study population clearly specified and defined? ➢ *The 'who' is clearly defined*			
3. Was the participation rate of eligible persons at least 50% at baseline?			
4. Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study pre-specified and applied uniformly to all participants?			
5. Was a sample size justification, power description, or variance and effect estimates provided? ➢ *At least N=128, based on the sample required to detect a medium effect of association between habit and behaviour*			
6. For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured? ➢ *Habit was assessed at baseline and practice behaviour at follow-up*			
7. Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed? ➢ *2-months timeframe between baseline and follow-up, based on Lally et al. (2010) European Journal of Social Psychology*			
8. For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (e.g., categories of exposure, or exposure measured as continuous variable)?			
9. Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?			
10. Was the exposure(s) assessed more than once over time? ➢ *Habit was assessed more than once*			
11. Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?			
12. Were the outcome assessors blinded to the exposure status of participants? ➢ *If blinding was not possible choose NA*			
13. Was loss to follow-up after baseline 20% or less?			
14. Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?			
*CD, cannot determine; NA, not applicable; NR, not reported			

Appendix L. Raw data used in CMA

Study	Habit-behaviour correlation	Sample size	Measure type	Type of behaviour
Bonetti 2009	0.57	133	objective	Providing dental treatment
Bonetti 2006	0.22	214	objective	Referring
Bonetti 2010	0.49	120	self-reported	Providing dental treatment
Eccles 2007	0.25	227	objective	Prescribing
Eccles 2007	0.46	252	self-reported	Prescribing
Eccles 2012	0.11	130	objective	Referring
Eccles 2012	0.28	130	self-reported	Referring
Grimshaw 2011	0.18	297	self-reported	Referring
Hrisos 2008	0.29	340	self-reported	Prescribing
Presseau 2014a	0.38	218	self-reported	Advising
Presseau 2014a	0.37	335	self-reported	Prescribing
Presseau 2014a	0.68	288	self-reported	Examining
Presseau 2014a	0.42	346	self-reported	Advising
Presseau 2014a	0.34	332	self-reported	Prescribing
Presseau 2014a	0.37	417	self-reported	Advising
Presseau 2014b	0.37	340	self-reported	Advising
Presseau 2014b	0.3	218	self-reported	Prescribing
Presseau 2014b	0.69	335	self-reported	Examining
Presseau 2014b	0.36	288	self-reported	Advising
Presseau 2014b	0.29	346	self-reported	Prescribing
Presseau 2014b	0.33	332	self-reported	Advising

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